



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT2205-3
FCC ID : IHDT56AE8
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Jun. 06, 2022 ~ Jun. 07, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

This report contains data that were produced under subcontract by Sporton International Inc. (ShenZhen).

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia



Approved by: Jason Jia

Sporton International Inc. (Kunshan)

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People's Republic of China**



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REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|--------------|---------|-------------------------|---------------|
| FR240834-01B | Rev. 01 | Initial issue of report | Jun. 20, 2022 |
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SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|----------------|--------------------|---|-----------------------|--------|---|
| 4.1 | 15.247(b)(3) | Peak Output Power | ≤ 30dBm | Pass | - |
| 4.2 | 15.247(d) | Radiated Band Edges and Spurious Emission | 15.209(a) & 15.247(d) | Pass | Under limit 5.73 dB at 2483.500 MHz |
| 4.3 | 15.203 & 15.247(b) | Antenna Requirement | 15.203 & 15.247(b) | Pass | - |

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

| Product Feature | |
|-----------------|----------------------------|
| Equipment | Mobile Cellular Phone |
| Brand Name | Motorola |
| Model Name | XT2205-3 |
| FCC ID | IHDT56AE8 |
| IMEI Code | Radiation: 351397430011580 |
| HW Version | DVT2 |
| SW Version | S2ST32.37 |
| EUT Stage | Identical Prototype |

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

1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|--|
| Tx/Rx Frequency Range | 2402 MHz ~ 2480 MHz |
| Number of Channels | 40 |
| Carrier Frequency of Each Channel | 40 Channel(37 hopping + 3 advertising channel) |
| Antenna Type / Gain | Loop Antenna with gain -5.0 dBi |
| Type of Modulation | Bluetooth LE : GFSK |

1.5 Modification of EUT

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



1.6 Specification of Accessory

| Specification of Accessory | | | | |
|----------------------------|------------|---------------------|------------|------------|
| AC Adapter 1 | Brand Name | Motorola(Salom) | Model Name | MC-301 |
| AC Adapter 2 | Brand Name | Motorola(Acbel) | Model Name | MC-301 |
| Battery | Brand Name | Motorola(ATL) | Model Name | NF50 |
| USB Cable 1 | Brand Name | Motorola(Saibao) | Model Name | SC18D13215 |
| USB Cable 2 | Brand Name | Motorola(Cabletech) | Model Name | SC18D13216 |
| USB Cable 3 | Brand Name | Motorola(Luxshare) | Model Name | SC18D13217 |

1.7 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

| | | | |
|---------------------------|--|----------------------------|---------------------------------------|
| Test Firm | Sporton International Inc. (Kunshan) | | |
| Test Site Location | No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958 | | |
| Test Site No. | Sporton Site No. | FCC Designation No. | FCC Test Firm Registration No. |
| | 03CH06-KS 03CH07-KS | CN1257 | 314309 |

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

| | | | |
|---------------------------|---|----------------------------|---------------------------------------|
| Test Firm | Sporton International Inc. (Shenzhen) | | |
| Test Site Location | 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595 | | |
| Test Site No. | Sporton Site No. | FCC Designation No. | FCC Test Firm Registration No. |
| | TH01-SZ | CN1256 | 421272 |

Test data subcontracted: conducted test case in section 4.1 of this report



1.8 Test Software

| Item | Site | Manufacturer | Name | Version |
|------|-----------|--------------|------|---------------|
| 1. | 03CH06-KS | AUDIX | E3 | 6.2009-8-24al |
| 2. | 03CH07-KS | AUDIX | E3 | 6.2009-8-24al |

1.9 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart C §15.247
- ♦ FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Re-use of Measured Data

2.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: XT2205-3, FCC ID: IHDT56AE8) is electrically identical to the reference device (Model: XT2205-1, XT2205-2, FCC ID: IHDT56AE7) for the portions of the circuitry corresponding to the data being re-used. Based on their similarity, the FCC Part 15C (equipment class: DTS) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 v01.

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID: IHDT56AE8 .

2.2 Model Difference Information

The **main** difference between FCC ID: IHDT56AE7 and FCC ID: IHDT56AE8 is as below:

- Add mmWave function.
- Remove some band

Other differences and all the details of similarity and difference can be found in the confidential documents (XT2205-3_Operational Description of Product Equality Declaration).

The re-used RF data includes the following bands provided in Appendix D (Sporton RF Report No. FR240834B for the reference device Model: XT2205-1, XT2205-2, FCC ID: IHDT56AE7).

2.3 Reference detail Section:

| Rule Part | Equipment Class | Frequency Band (MHz) | Reference FCC ID(Parent) | Type Grant/ Permissive Change | Reference Title | FCC ID Filling (Variant) | Report Title/Section |
|-----------|-----------------|----------------------|--------------------------|-------------------------------|-----------------|--------------------------|--|
| 15C | DTS (BLE) | 2400~2483.5 | IHDT56AE7 | Original Grant | FR240834B | IHDT56AE8 | All sections applicable except for RSE |



2.4 Spot Check Verification Data Section

Conducted power test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model

Summary for power and RSE spot check for each rule entry and technology is listed as below:

| Test Item | Mode | IHDT56AE7 Parent Worst Result | IHDT56AE8 Variant Check Result | Difference (dB) |
|-----------------------|------------|-------------------------------------|--------------------------------------|-----------------|
| Conducted Power (dBm) | BLE1M CH19 | 7.54 | 7.41 | -0.13 |

Conclusion:

Based on the spot check test result, the test data from the original model is representative for the variant model. The power level spot check are shown within expected level compliant to limit line.

We confirm that the test data reuse policy of FCC KDB 484596 D01 Referencing Test Data v01 has been followed and the test data as referenced from the parent model report represents compliance with new FCC ID.



3 Test Configuration of Equipment Under Test

3.1 Carrier Frequency Channel

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|-----------------|---------|-------------|---------|-------------|
| 2400-2483.5 MHz | 0 | 2402 | 21 | 2444 |
| | 1 | 2404 | 22 | 2446 |
| | 2 | 2406 | 23 | 2448 |
| | 3 | 2408 | 24 | 2450 |
| | 4 | 2410 | 25 | 2452 |
| | 5 | 2412 | 26 | 2454 |
| | 6 | 2414 | 27 | 2456 |
| | 7 | 2416 | 28 | 2458 |
| | 8 | 2418 | 29 | 2460 |
| | 9 | 2420 | 30 | 2462 |
| | 10 | 2422 | 31 | 2464 |
| | 11 | 2424 | 32 | 2466 |
| | 12 | 2426 | 33 | 2468 |
| | 13 | 2428 | 34 | 2470 |
| | 14 | 2430 | 35 | 2472 |
| | 15 | 2432 | 36 | 2474 |
| | 16 | 2434 | 37 | 2476 |
| | 17 | 2436 | 38 | 2478 |
| | 18 | 2438 | 39 | 2480 |
| | 19 | 2440 | - | - |
| 20 | 2442 | - | - | |

3.2 Test Mode

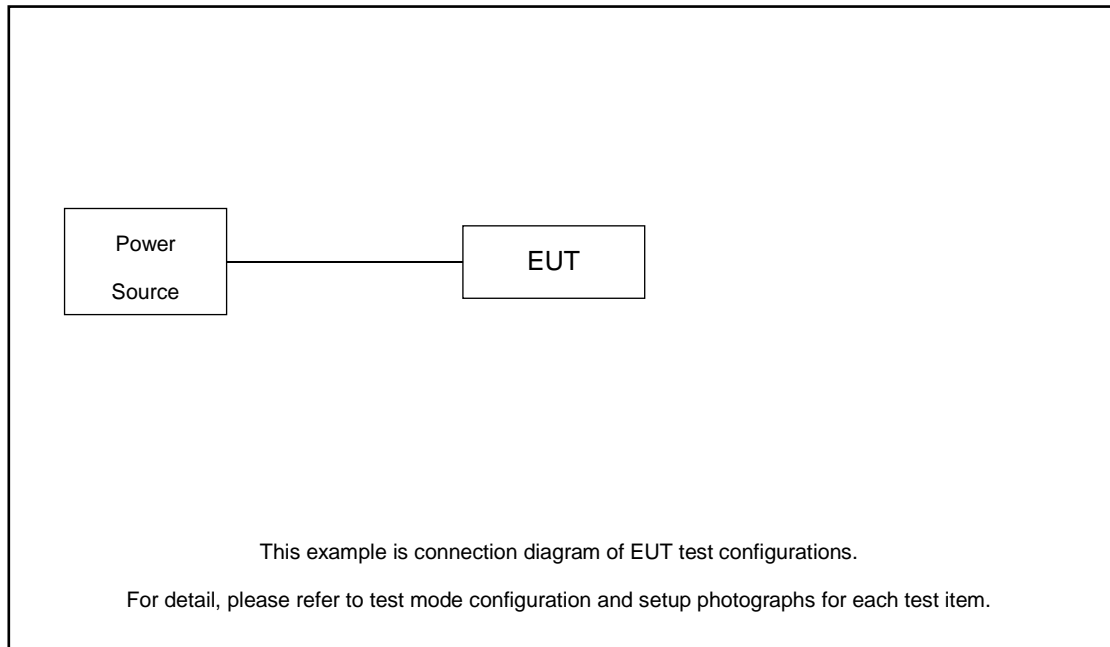
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever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

The following summary table is showing all test modes to demonstrate in compliance with the standard.

| Summary table of Test Cases | |
|--|---|
| Test Item | Data Rate / Modulation |
| | Bluetooth – LE / GFSK |
| Radiated | Bluetooth Tx CH39_2480 MHz_1Mbps Co-location Mode: Bluetooth Tx CH39_2480 MHz_1Mbps +5G NR n5 Link |
| Remark: 1. The RSE is tested with accessories from the worst case of Part 15B report. 2. RSE Co-lolation mode are from the worst combination of BLE TX and 5G NR Link mode. | |

3.3 Connection Diagram of Test System

Radiated Emission:



3.4 EUT Operation Test Setup

For BLE function, the engineering test program was provided and enabled to make EUT continuous transmit.

4 Test Result

4.1 Output Power Measurement

4.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

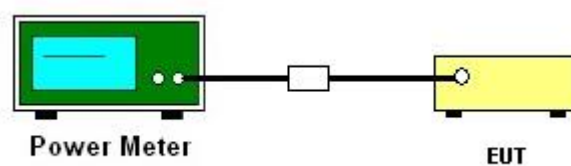
4.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

4.1.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

4.1.4 Test Setup



4.1.5 Test Result of Peak Output Power

Please refer to Spot Check Verification Data Section.



4.2 Radiated Band Edges and Spurious Emission Measurement

4.2.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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

4.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

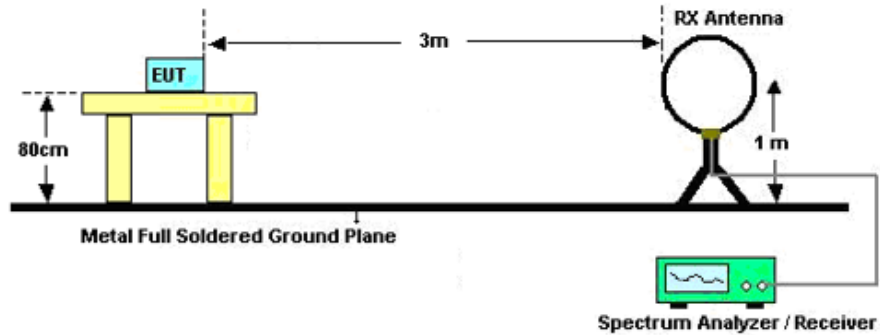


4.2.3 Test Procedures

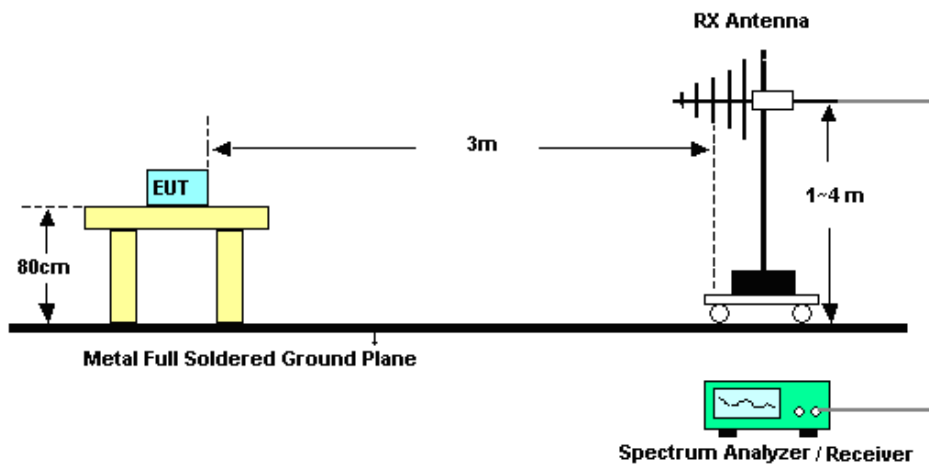
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

4.2.4 Test Setup

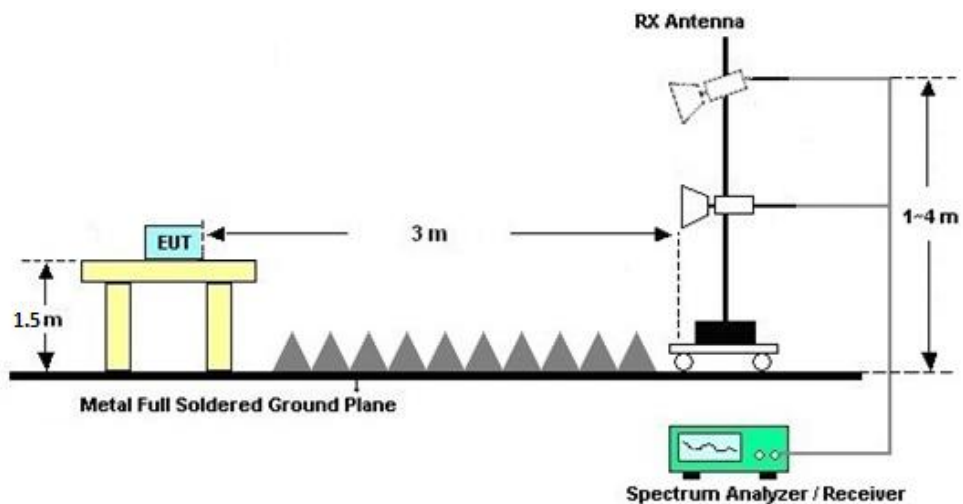
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





4.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

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

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

4.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

4.2.7 Duty Cycle

Please refer to Appendix B.

4.2.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix A.



4.3 Antenna Requirements

4.3.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 rule.

4.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

4.3.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



5 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---------------------------|--------------|------------------------|--------------|----------------------|------------------|---------------|---------------|-----------------------|
| Pulse Power Sensor | Anritsu | MA2411B | 1339473 | 30MHz~40GHz | Dec. 28, 2021 | Jun. 07, 2022 | Dec. 27, 2022 | Conducted (TH01-SZ) |
| Power Meter | Anritsu | ML2495A | 1542004 | 50MHz Bandwidth | Dec. 28, 2021 | Jun. 07, 2022 | Dec. 27, 2022 | Conducted (TH01-SZ) |
| EMI Test Receiver | Keysight | N9038A | MY56400004 | 3Hz~8.5GHz;Max 30dBm | Oct. 16, 2021 | Jun. 06, 2022 | Oct. 15, 2022 | Radiation (03CH06-KS) |
| EXA Spectrum Analyzer | Keysight | N9010B | MY60242126 | 10Hz-44GHz | Oct. 26, 2021 | Jun. 06, 2022 | Oct. 25, 2022 | Radiation (03CH06-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117 | 00240138 | 1GHz~18GHz | Jul. 19, 2021 | Jun. 06, 2022 | Jul. 18, 2022 | Radiation (03CH06-KS) |
| SHF-EHF Horn | Com-power | AH-840 | 101093 | 18GHz~40GHz | Jan. 05, 2022 | Jun. 06, 2022 | Jan. 04, 2023 | Radiation (03CH06-KS) |
| Amplifier | MITEQ | EM18G40GGA | 060728 | 18~40GHz | Jan. 05, 2022 | Jun. 06, 2022 | Jan. 04, 2023 | Radiation (03CH06-KS) |
| high gain Amplifier | MITEQ | AMF-7D-00101800-30-10P | 2025788 | 1Ghz-18Ghz | Jul. 30, 2021 | Jun. 06, 2022 | Jul. 29, 2022 | Radiation (03CH06-KS) |
| Amplifier | Keysight | 83017A | MY53270319 | 500MHz~26.5GHz | Oct. 14, 2021 | Jun. 06, 2022 | Oct. 13, 2022 | Radiation (03CH06-KS) |
| AC Power Source | Chroma | 61601 | F104090004 | N/A | NCR | Jun. 06, 2022 | NCR | Radiation (03CH06-KS) |
| Turn Table | ChamPro | EM 1000-T | 060762-T | 0~360 degree | NCR | Jun. 06, 2022 | NCR | Radiation (03CH06-KS) |
| Antenna Mast | ChamPro | EM 1000-A | 060762-A | 1 m~4 m | NCR | Jun. 06, 2022 | NCR | Radiation (03CH06-KS) |
| EMI Test Receiver | R&S | ESR7 | 101403 | 9kHz~7GHz;Max 30dBm | Oct. 16, 2021 | Jun. 07, 2022 | Oct. 15, 2022 | Radiation (03CH07-KS) |
| EXA Spectrum Analyzer | Keysight | N9010A | MY55370528 | 10Hz-44G,MAX 30dB | Oct. 16, 2021 | Jun. 07, 2022 | Oct. 15, 2022 | Radiation (03CH07-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 100321 | 9kHz~30MHz | Oct. 30, 2021 | Jun. 07, 2022 | Oct. 29, 2022 | Radiation (03CH07-KS) |
| Bilog Antenna | TeseQ | CBL6111D | 44483 | 30MHz-1GHz | Dec. 22, 2021 | Jun. 07, 2022 | Dec. 21, 2022 | Radiation (03CH07-KS) |
| Amplifier | SONOMA | 310N | 413740 | 9KHz-1GHz | Jan. 05, 2022 | Jun. 07, 2022 | Jan. 04, 2023 | Radiation (03CH07-KS) |
| AC Power Source | Chroma | 61601 | 616010002473 | N/A | NCR | Jun. 07, 2022 | NCR | Radiation (03CH07-KS) |
| Turn Table | MF | MF7802 | N/A | 0~360 degree | NCR | Jun. 07, 2022 | NCR | Radiation (03CH07-KS) |
| Antenna Mast | MF | MF7802 | N/A | 1 m~4 m | NCR | Jun. 07, 2022 | NCR | Radiation (03CH07-KS) |

NCR: No Calibration Required



6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

| Test Item | Uncertainty |
|-----------------|-------------|
| Conducted Power | 1.34 dB |

For 03CH07-KS

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

| | |
|---|-------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.0dB |
|---|-------|

For 03CH06-KS

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

| | |
|---|-------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.0dB |
|---|-------|

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

| | |
|---|-------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.0dB |
|---|-------|

----- THE END -----



Appendix A. Radiated Spurious Emission

Only the worst results are shown in the report

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

| BLE | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Path Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|-------------------------|---|-----------|------------|------------|------------|------------|----------------|-----------|---------------|---------|-----------|-----------|---------|
| | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| BLE CH 39 2480MHz | | 2486.56 | 55.84 | -18.16 | 74 | 49.55 | 32.2 | 6.73 | 32.64 | 154 | 193 | P | H |
| | | 2483.5 | 47.05 | -6.95 | 54 | 40.76 | 32.2 | 6.73 | 32.64 | 154 | 193 | A | H |
| | * | 2480 | 95.2 | - | - | 88.91 | 32.2 | 6.73 | 32.64 | 154 | 193 | P | H |
| | * | 2480 | 93.76 | - | - | 87.47 | 32.2 | 6.73 | 32.64 | 154 | 193 | A | H |
| | | 2485.12 | 56.35 | -17.65 | 74 | 50.06 | 32.2 | 6.73 | 32.64 | 304 | 137 | P | V |
| | | 2483.5 | 46.84 | -7.16 | 54 | 40.55 | 32.2 | 6.73 | 32.64 | 304 | 137 | A | V |
| | * | 2480 | 95.29 | - | - | 89 | 32.2 | 6.73 | 32.64 | 304 | 137 | P | V |
| | * | 2480 | 93.92 | - | - | 87.63 | 32.2 | 6.73 | 32.64 | 304 | 137 | A | V |
| Remark | 1. No other spurious found. 2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |



2.4GHz 2400~2483.5MHz
BLE (Harmonic @ 3m)

Table with 14 columns: BLE, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for BLE CH 39 2480MHz and a Remark section.



Emission below 1GHz

2.4GHz BLE (LF)

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Path | Preamp | Ant | Table | Peak | Pol. |
|---------------------|--|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| 2.4GHz BLE LF | | 30.97 | 24.4 | -15.6 | 40 | 31.74 | 24.7 | 0.76 | 32.8 | - | - | P | H |
| | | 48.43 | 24.2 | -15.8 | 40 | 41.19 | 15 | 0.98 | 32.97 | - | - | P | H |
| | | 84.32 | 25.82 | -14.18 | 40 | 43.62 | 13.7 | 1.32 | 32.82 | - | - | P | H |
| | | 169.68 | 24.12 | -19.38 | 43.5 | 39.84 | 15.3 | 1.9 | 32.92 | - | - | P | H |
| | | 226.91 | 24.73 | -21.27 | 46 | 39.98 | 15.76 | 2.09 | 33.1 | - | - | P | H |
| | | 348.16 | 24.79 | -21.21 | 46 | 34.78 | 20.16 | 2.75 | 32.9 | - | - | P | H |
| | | 30.97 | 33.29 | -6.71 | 40 | 40.63 | 24.7 | 0.76 | 32.8 | - | - | P | V |
| | | 60.07 | 29.01 | -10.99 | 40 | 49.24 | 11.8 | 1.07 | 33.1 | - | - | P | V |
| | | 110.51 | 28.16 | -15.34 | 43.5 | 42.63 | 16.85 | 1.56 | 32.88 | - | - | P | V |
| | | 168.71 | 24.38 | -19.12 | 43.5 | 40 | 15.4 | 1.89 | 32.91 | - | - | P | V |
| | | 214.3 | 25.32 | -18.18 | 43.5 | 41.47 | 14.86 | 2.09 | 33.1 | - | - | P | V |
| | | 509.18 | 22.34 | -23.66 | 46 | 28.15 | 23.8 | 3.15 | 32.76 | - | - | P | V |
| Remark | 1. No other spurious found. 2. All results are PASS against limit line. | | | | | | | | | | | | |



Co-location Mode

2.4GHz 2400~2483.5MHz

BLE&Part22H_SA-NSA_n5 (Band Edge @ 3m)

| BLE | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Path Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|-------------------------|--|-----------|------------|------------|------------|------------|----------------|-----------|---------------|---------|-----------|-----------|---------|
| | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| BLE CH 39 2480MHz | | 2484.52 | 57.01 | -16.99 | 74 | 48.28 | 32.12 | 7.28 | 30.67 | 393 | 96 | P | H |
| | | 2483.5 | 48.27 | -5.73 | 54 | 39.54 | 32.12 | 7.28 | 30.67 | 393 | 96 | A | H |
| | * | 2482 | 96.21 | - | - | 87.48 | 32.12 | 7.28 | 30.67 | 393 | 96 | P | H |
| | * | 2479 | 95.15 | - | - | 86.42 | 32.12 | 7.28 | 30.67 | 393 | 96 | A | H |
| | | 2491.72 | 56.21 | -17.79 | 74 | 47.41 | 32.15 | 7.32 | 30.67 | 400 | 44 | P | V |
| | | 2483.5 | 47.79 | -6.21 | 54 | 39.06 | 32.12 | 7.28 | 30.67 | 400 | 44 | A | V |
| | * | 2479 | 94.57 | - | - | 85.84 | 32.12 | 7.28 | 30.67 | 400 | 44 | P | V |
| | * | 2479 | 93.52 | - | - | 84.79 | 32.12 | 7.28 | 30.67 | 400 | 44 | A | V |
| Remark | <p>3. No other spurious found.</p> <p>4. All results are PASS against Peak and Average limit line.</p> | | | | | | | | | | | | |



2.4GHz 2400~2483.5MHz

BLE&Part22H_SA-NSA_n5 (Harmonic @ 3m)

| BLE | Note | Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB/m) | Path Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Peak Avg. (P/A) | Pol. (H/V) |
|-------------------------|--|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| BLE CH 39 2480MHz | | 4965 | 37.71 | -36.29 | 74 | 58.55 | 34.1 | 10.51 | 65.45 | 100 | 360 | P | H |
| | | 7440 | 41.95 | -32.05 | 74 | 58.6 | 35.8 | 12.88 | 65.33 | 100 | 360 | P | H |
| | | 4965 | 36.89 | -37.11 | 74 | 57.73 | 34.1 | 10.51 | 65.45 | 300 | 360 | P | V |
| | | 7440 | 42.52 | -31.48 | 74 | 59.17 | 35.8 | 12.88 | 65.33 | 300 | 360 | P | V |
| Remark | <p>3. No other spurious found.</p> <p>4. All results are PASS against Peak and Average limit line.</p> | | | | | | | | | | | | |



Note symbol

| | |
|-----|--|
| * | Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. |
| ! | Test result is over limit line. |
| P/A | Peak or Average |
| H/V | Horizontal or Vertical |



A calculation example for radiated spurious emission is shown as below:

| BLE | Note | Frequency | Level | Over | Limit | Read | Antenna | Path | Preamp | Ant | Table | Peak | Pol. |
|-------------------------|------|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
| | | (MHz) | (dBμV/m) | (dB) | (dBμV/m) | (dBμV) | (dB/m) | (dB) | (dB) | (cm) | (deg) | (P/A) | (H/V) |
| BLE CH 00 2402MHz | | 2390 | 55.45 | -18.55 | 74 | 54.51 | 32.22 | 4.58 | 35.86 | 103 | 308 | P | H |
| | | 2390 | 43.54 | -10.46 | 54 | 42.6 | 32.22 | 4.58 | 35.86 | 103 | 308 | A | H |

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

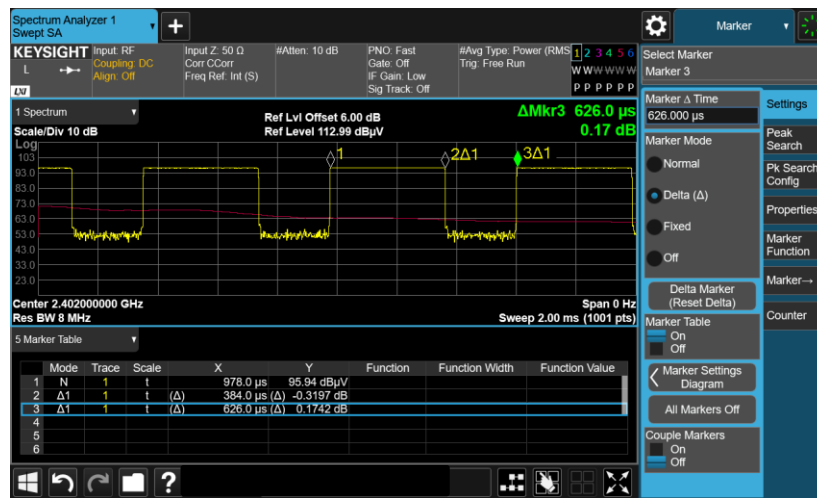
Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix B. Duty Cycle Plots

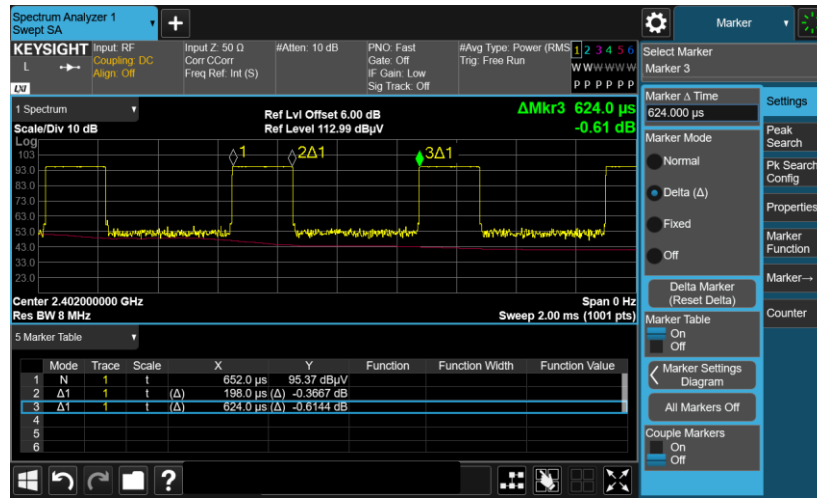
| Band | Duty Cycle(%) | T(ms) | 1/T(kHz) | VBW Setting |
|--------------------|---------------|-------|----------|-------------|
| Bluetooth LE 1Mbps | 61.34 | 0.384 | 2.604 | 2.7KHz |
| Bluetooth LE 2Mbps | 31.73 | 0.198 | 5.051 | 5.1KHz |

Bluetooth LE 1Mbps





Bluetooth LE 2Mbps





Appendix D. Reference Report

Please refer to Sporton report number FR240834B which is issued separately.