



FCC EMI TEST REPORT

FCC ID : LHJ-FE5NA0010
Equipment : FE5NA0010, FE5NA0011
Brand Name : Continental
Model Name : FE5NA0010, FE5NA0011
Applicant : Continental Automotive Systems, Inc.
21440 W Lake Cook Rd., Deer Park, IL 60010, USA
Manufacturer : Continental Automotive Systems, Inc.
21440 W Lake Cook Rd., Deer Park, IL 60010, USA
Standard : FCC 47 CFR FCC Part 15 Subpart B Class B

The product was received on Nov. 06, 2023 and testing was performed from Jan. 19, 2024 to Jan. 19, 2024. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4a-2017 and has been in compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



Table of Contents

| | |
|--|-----------|
| History of this test report..... | 3 |
| Summary of Test Result..... | 4 |
| 1. General Description | 5 |
| 1.1. Product Feature of Equipment Under Test | 5 |
| 1.2. Product Specification of Equipment Under Test | 6 |
| 1.3. Modification of EUT | 7 |
| 1.4. Test Location | 8 |
| 1.5. Applicable Standards | 8 |
| 2. Test Configuration of Equipment Under Test | 9 |
| 2.1. Test Mode | 9 |
| 2.2. Connection Diagram of Test System | 9 |
| 2.3. Support Unit used in test configuration and system..... | 10 |
| 2.4. EUT Operation Test Setup | 10 |
| 3. Test Result | 11 |
| 3.1. Test of Radiated Emission Measurement | 11 |
| 4. List of Measuring Equipment..... | 13 |
| 5. Measurement Uncertainty | 14 |
| Appendix A. Radiated Emission Test Result | |
| Appendix B. Setup Photographs | |



History of this test report

| Report No. | Version | Description | Issue Date |
|-------------|---------|-------------------------|---------------|
| FC2N2201-11 | 01 | Initial issue of report | Feb. 21, 2024 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |



Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|-----------------|-----------------------|--------------------|---------------------------------------|
| - | 15.107 | AC Conducted Emission | Not Required | - |
| 3.1 | 15.109 | Radiated Emission | Pass | 12.74 dB under the limit at 31.62 MHz |

Note:

1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report by changing SW and enabling internal antenna support band for LTE, LTE CA, 5G FR1. All the test cases were performed on original report which can be referred to Sporton Report Number FC2N2201-06. Based on the original report, only worst case was verified.

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Yun Huang

Report Producer: Lilian Hou



1. General Description

1.1. Product Feature of Equipment Under Test

| Product Feature | |
|---------------------------------|---|
| Equipment | FE5NA0010, FE5NA0011 |
| Brand Name | Continental |
| Model Name | FE5NA0010, FE5NA0011 |
| FCC ID | LHJ-FE5NA0010 |
| Installed into the Host | Equipment name: G12N510G1, G12N500G1 Brand name: Continental Model name: G12N510G1, G12N500G1 |
| EUT supports Radios application | WCDMA/HSPA/LTE/5G NR/GNSS |
| EUT Stage | Identical Prototype |

| Sample Information | | | |
|--------------------|-----------|-------------|---|
| Sample | TA-code | L2/L5 GNSS | Band Difference |
| 1 | FE5NA0010 | Support | / |
| 2 | FE5NA0011 | Not Support | BOM change: depopulated passive components from the GNSS RF front-end |

Remark: The above EUT's information was declared by manufacturer.



1.2. Product Specification of Equipment Under Test

| Product Specification is subject to this standard | |
|---|--|
| Tx Frequency | WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 14 :790.5 MHz ~ 795.5 MHz LTE Band 66: 1710.7 MHz ~ 1754.3 MHz LTE Band 71: 665.5 MHz ~ 695.5 MHz 5G NR n2: 1852.5 MHz ~ 1907.5 MHz 5G NR n5: 826.5 MHz ~ 846.5 MHz 5G NR n25: 1852.5 MHz ~ 1912.5 MHz 5G NR n41: 2506.02 MHz ~ 2679.99 MHz 5G NR n66: 1712.5 MHz ~ 1777.5 MHz 5G NR n71: 668.0 MHz ~ 693.0 MHz 5G NR n77: 3700 MHz ~ 3980 MHz |
| Rx Frequency | WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band IV: 2112.4 MHz ~ 2152.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz LTE Band 2: 1930.7 MHz ~ 1989.3 MHz LTE Band 4: 2110.7 MHz ~ 2154.3 MHz LTE Band 5: 869.7 MHz ~ 893.3 MHz LTE Band 7: 2622.5 MHz ~ 2687.5 MHz LTE Band 12: 729.7 MHz ~ 745.3 MHz LTE Band 13: 748.5 MHz ~ 753.5 MHz LTE Band 14: 760.5 MHz ~ 765.5 MHz LTE Band 29: 718.5 MHz ~ 726.5 MHz LTE Band 30: 2352.5 MHz ~ 2357.5 MHz LTE Band 66: 2110.7 MHz ~ 2154.3 MHz LTE Band 71: 619.5 MHz ~ 649.5 MHz 5G NR n2: 1932.5 MHz ~ 1987.5 MHz 5G NR n5: 871.5 MHz ~ 891.5 MHz 5G NR n25: 1932.5 MHz ~ 1992.5 MHz 5G NR n41: 2506.02 MHz ~ 2679.99 MHz 5G NR n66: 1712.5 MHz ~ 1777.5 MHz 5G NR n71: 668.0 MHz ~ 693.0 MHz 5G NR n77: 3700 MHz ~ 3980 MHz GNSS: 1559 MHz ~ 1610 MHz (GPS / Glonass / BDS / Galileo / SBAS) |



| Product Specification is subject to this standard | |
|---|--|
| Antenna Type | WWAN: < External (Model: 86783279) >: External Sharkfin Antenna + XM + Dual GNSS +5G < External (Model: 42862899) >: external sharkfin antenna, sharkfin NA 5G+Dual GNSS+XM < External (Model: 26464255) >: external sharkfin antenna, North America 5G L1 Only + XM < External (Model: 26464260) >: external sharkfin antenna, North America 5G L1/L5 + XM < External (Model: 42808214/42808215/42808227) >: external sharkfin antenna, 12 OnStar Sharkfin Antenna + XM + Dual GNSS +5G < Internal (Model: INTANT01, INTANT02) >: TCP Antenna GNSS: < External (Model: 86783279) >: External Sharkfin Antenna + XM + Dual GNSS +5G < External (Model: 42862899) >: external sharkfin antenna, sharkfin NA 5G+Dual GNSS+XM < External (Model: 26464255) >: external sharkfin antenna, North America 5G L1 Only + XM < External (Model: 26464260) >: external sharkfin antenna, North America 5G L1/L5 + XM < External (Model: 42808214/42808215/42808227) >: external sharkfin antenna, 12 OnStar Sharkfin Antenna + XM + Dual GNSS +5G |
| Type of Modulation | WCDMA: QPSK (Uplink) HSDPA: 64QAM (Downlink) HSUPA : QPSK (Uplink) LTE: QPSK / 16QAM / 64QAM 5G NR: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM GNSS: BPSK |

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to Disclaimer in report summary.
2. Ant 4 = Primary Antenna, Ant 3 = Secondary Antenna.

1.3. Modification of EUT

No modifications made to the EUT during the testing.



1.4. Test Location

| | |
|---------------------------|---|
| Test Site | Sporton International Inc. EMC & Wireless Communications Laboratory |
| Test Site Location | No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978 |
| Test Site No. | Sporton Site No. 03CH06-HY |

FCC designation No.: TW1093

1.5. Applicable Standards

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

- ♦ FCC 47 CFR FCC Part 15 Subpart B Class B
- ♦ ANSI C63.4a-2017

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

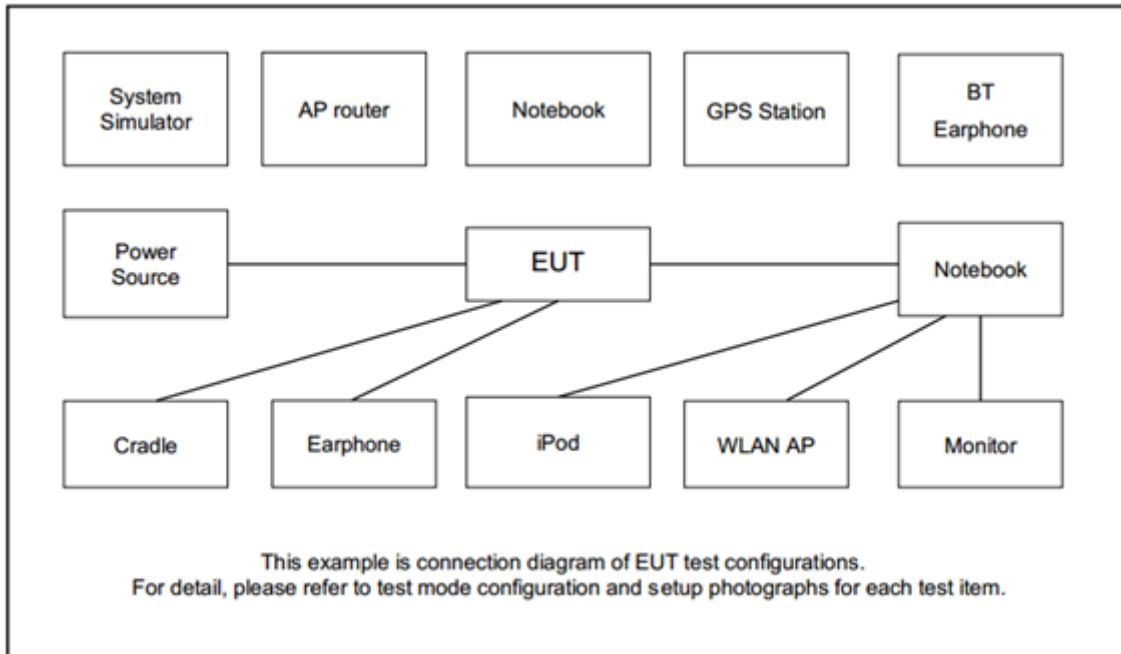
2. Test Configuration of Equipment Under Test

2.1. Test Mode

The EUT is tested along with the peripherals, operating under possible configurations in compliant with normal operation. The maximum emissions can be identified by a pre-scan carried out in different orientations of placement pursuant to ANSI C63.4a-2017. Frequency range covered: Radiation Emission (30 MHz to the 5th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

| Test Items | Functions Enabled |
|--|--|
| Radiated Emissions | Mode 1 : WCDMA Band V Idle (with External Antenna) + GPS Rx + TC for sample 2 Mode 2 : WCDMA Band V Idle (with Internal Antenna) + GPS Rx + TC for sample 2 |
| Remark: | |
| <ol style="list-style-type: none"> The worst case of RE is mode 1; only the test data of this mode was reported. For Radiation Emission after pre-scanned the cellular band between 30MHz ~ 960MHz (WCDMA Band V); only the worst case for cellular band test data of this mode was reported. TC stands for test configuration, and consists of EUT, "Teddy Jr Load Box (X1 + X2), Sharkfin Antenna with metal plate (X3), Ethernet connector cable (X7), Battery", Teddy Jr Load Box, "Notebook (USB Cable *2), Adapter and DC Cable". | |

2.2. Connection Diagram of Test System





2.3. Support Unit used in test configuration and system

| Item | Equipment | Brand Name | Model Name | FCC ID | Data Cable | Power Cord |
|------|-------------------|-------------|------------|--------|------------|-------------------|
| 1. | System Simulator | Anritsu | MT8821C | N/A | N/A | Unshielded, 1.8 m |
| 2. | GPS Station | Pendulum | GSG-54 | N/A | N/A | Unshielded, 1.8 m |
| 3. | WWAN Antenna | Amphenol | 42862899 | N/A | N/A | N/A |
| 4. | Teddy Jr Load Box | Continental | N/A | N/A | N/A | N/A |
| 5. | Adapter | TePoo | PT-WC-03 | N/A | N/A | N/A |
| 6. | Metal Plate | N/A | N/A | N/A | N/A | N/A |

2.4. EUT Operation Test Setup

The EUT is in WCDMA idle mode during the test. The EUT is synchronized with the BCCH, and has been continuous receiving mode by setting paging reorganization of the system simulator.

The following programs installed in the EUT are programmed during the test:

1. Execute "lte_x24_hwtool_0.6.24.exe" to make the EUT receive continuous signals from GPS station.



3. Test Result

3.1. Test of Radiated Emission Measurement

3.1.1. Limit of Radiated Emission

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

<Class B>

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

3.1.2. Measuring Instruments

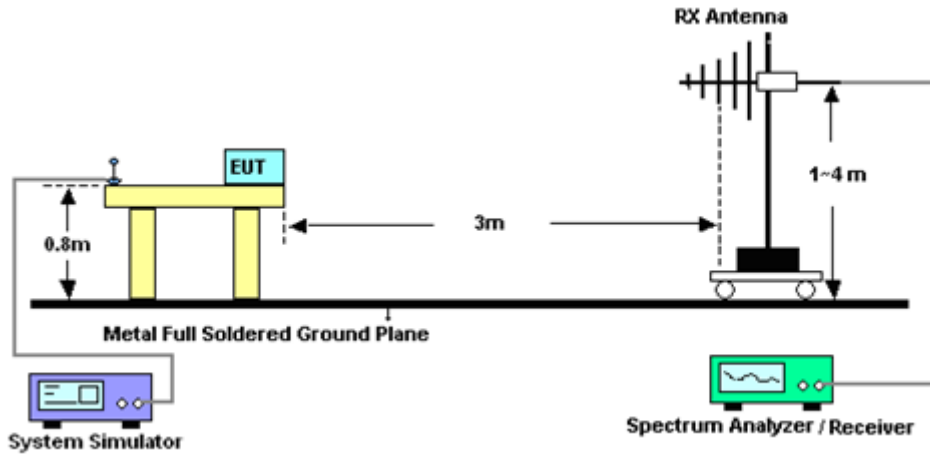
Please refer to the measuring equipment list in this test report.

3.1.3. Test Procedures

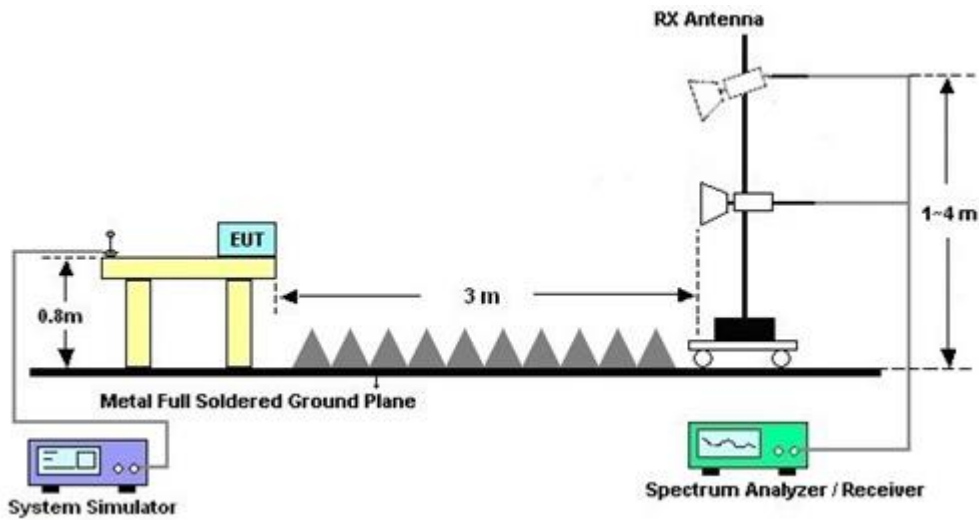
1. The EUT is placed on a turntable with 0.8 meter above ground.
2. The EUT is set 3 meters from the interference receiving antenna, which is mounted on the top of a variable height antenna tower.
3. The table is rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its 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 is 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=120 kHz/VBW=300 kHz for frequency below 1 GHz; RBW=1 MHz VBW=3 MHz (Peak), RBW=1 MHz/VBW=10 Hz (Average) for frequency above 1 GHz).
7. If the emission level of the EUT in peak mode is 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.

3.1.4. Test Setup of Radiated Emission

For Radiated Emissions from 30 MHz to 1 GHz



For Radiated Emissions above 1GHz



3.1.5. Test Result of Radiated Emission

Please refer to Appendix A.



4. List of Measuring Equipment

| Instrument | Brand Name | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|-------------------|-----------------|---|--|-------------------------------|------------------|---------------|---------------|-----------------------|
| Amplifier | SONOMA | 310N | 186713 | 9kHz~1GHz | Apr. 17, 2023 | Jan. 19, 2024 | Apr. 16, 2024 | Radiation (03CH06-HY) |
| Bilog Antenna | Schaffner | CBL 6111C & N-6-06 | 2725 & AT-N0601 | 30MHz~1GHz | Nov. 03, 2023 | Jan. 19, 2024 | Nov. 02, 2024 | Radiation (03CH06-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESU26 | 100472 | 20Hz~26.5GHz | Feb. 13, 2023 | Jan. 19, 2024 | Feb. 12, 2024 | Radiation (03CH06-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1212 | 1GHz~18GHz | Mar. 23, 2023 | Jan. 19, 2024 | Mar. 22, 2024 | Radiation (03CH06-HY) |
| Preamplifier | Jet-Power | JPA00101800-30-10P | 1601180001 | 1GHz~18GHz | Jul. 16, 2023 | Jan. 19, 2024 | Jul. 15, 2024 | Radiation (03CH06-HY) |
| RF Cable | HUBER + SUHNER | 104 SF102_2000mm SF102_3000mm SF102_7000mm | 802433/4 532421/2 532422/2 532299/2 | 30Mhz to 18Ghz | Jul. 03, 2023 | Jan. 19, 2024 | Jul. 02, 2024 | Radiation (03CH06-HY) |
| Hygrometer | TECPEL | DTM-303B | TP210018 | N/A | Oct. 24, 2023 | Jan. 19, 2024 | Oct. 23, 2024 | Radiation (03CH06-HY) |
| Controller | INN-CO | EM1000 | 060782 | Control Turn table & Ant Mast | N/A | Jan. 19, 2024 | N/A | Radiation (03CH06-HY) |
| Antenna Mast | MF | MF-7802 | MF780208212 | 1m~4m | N/A | Jan. 19, 2024 | N/A | Radiation (03CH06-HY) |
| Turn Table | INN-CO | DS2000 | 420/650/00 | 0-360 degree | N/A | Jan. 19, 2024 | N/A | Radiation (03CH06-HY) |
| Software | Audix | E3 6.2009-8-24(k5) | N/A | N/A | N/A | Jan. 19, 2024 | N/A | Radiation (03CH06-HY) |



5. Measurement Uncertainty

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

| | |
|---|--------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 6.3 dB |
|---|--------|

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

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

Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

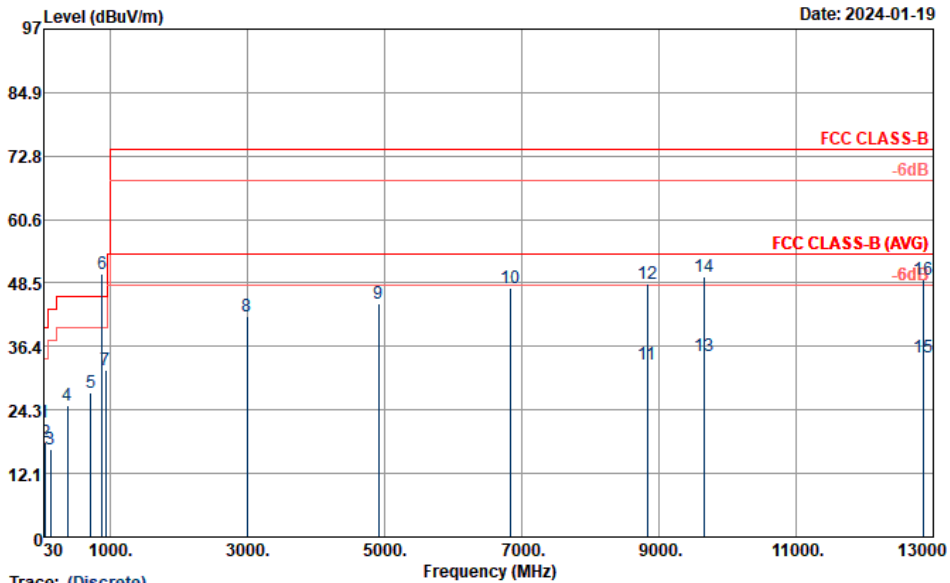
| | |
|---|--------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 4.6 dB |
|---|--------|



Appendix A. Radiated Emission Test Result

| | | | |
|-----------------|---|---------------------|------------|
| Test Engineer : | Bor-Shiang,Huang | Temperature : | 23~26°C |
| | | Relative Humidity : | 43~47% |
| Test Distance : | 3m | Polarization : | Horizontal |
| Remark : | #6 is system simulator signal which can be ignored. | | |

- Emission level (dBμV/m) = 20 log Emission level (μV/m)
- Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor
- Corrected Reading: Factor(dB) + Read Level = Level



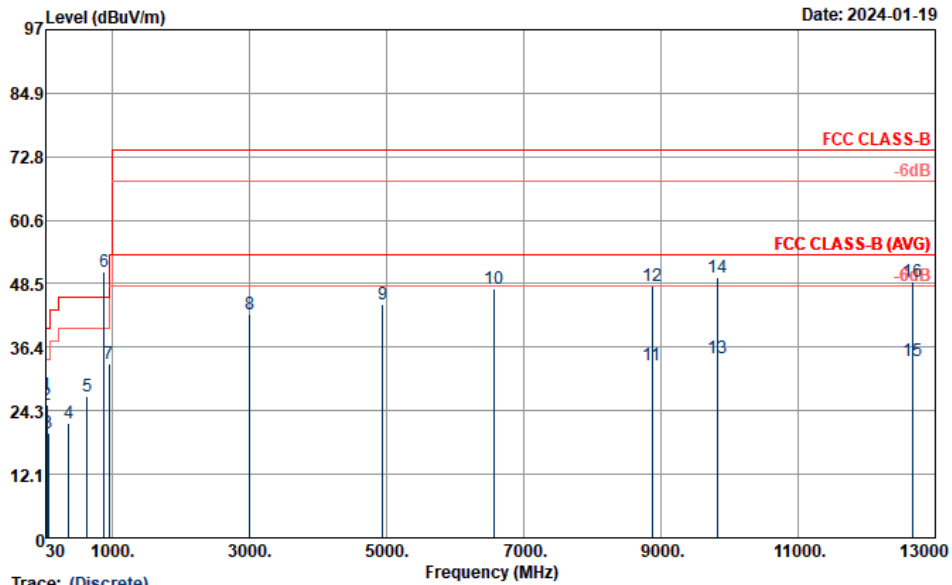
Trace: (Discrete)
 Site : 03CH06-HY
 Condition : FCC CLASS-B 3m 9120D_1212 HORIZONTAL
 Project : 2N2201-11
 Power : From Battery
 Memo : Mode 1

| | Freq | Level | Over | Limit | Read | Factor | A/Pos | T/Pos | Remark |
|-----|----------|--------|--------|--------|-------|--------|-------|-------|--------------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | cm | deg | |
| 1 | 31.89 | 21.81 | -18.19 | 40.00 | 29.16 | -7.35 | --- | --- | Peak |
| 2 | 51.06 | 18.06 | -21.94 | 40.00 | 34.57 | -16.51 | --- | --- | Peak |
| 3 | 127.74 | 16.62 | -26.88 | 43.50 | 28.70 | -12.08 | --- | --- | Peak |
| 4 | 371.40 | 25.11 | -20.89 | 46.00 | 32.87 | -7.76 | --- | --- | Peak |
| 5 | 710.90 | 27.64 | -18.36 | 46.00 | 28.39 | -0.75 | --- | --- | Peak |
| 6 * | 881.70 | 50.36 | | | 48.31 | 2.05 | --- | --- | Peak |
| 7 | 934.20 | 31.91 | -14.09 | 46.00 | 28.09 | 3.82 | --- | --- | Peak |
| 8 | 2998.00 | 42.26 | -31.74 | 74.00 | 63.79 | -21.53 | --- | --- | Peak |
| 9 | 4914.00 | 44.45 | -29.55 | 74.00 | 62.02 | -17.57 | --- | --- | Peak |
| 10 | 6836.00 | 47.43 | -26.57 | 74.00 | 60.23 | -12.80 | --- | --- | Peak |
| 11 | 8826.00 | 33.04 | -20.96 | 54.00 | 43.19 | -10.15 | 100 | 65 | Average Peak |
| 12 | 8826.00 | 48.37 | -25.63 | 74.00 | 58.52 | -10.15 | 100 | 65 | Peak |
| 13 | 9656.00 | 34.61 | -19.39 | 54.00 | 43.39 | -8.78 | 100 | 145 | Average |
| 14 | 9656.00 | 49.71 | -24.29 | 74.00 | 58.49 | -8.78 | 100 | 145 | Peak |
| 15 | 12862.00 | 34.38 | -19.62 | 54.00 | 39.00 | -4.62 | 100 | 165 | Average |
| 16 | 12862.00 | 49.12 | -24.88 | 74.00 | 53.74 | -4.62 | 100 | 165 | Peak |



| | | | |
|-----------------|---|---------------------|----------|
| Test Engineer : | Bor-Shiang,Huang | Temperature : | 23~26°C |
| | | Relative Humidity : | 43~47% |
| Test Distance : | 3m | Polarization : | Vertical |
| Remark : | #6 is system simulator signal which can be ignored. | | |

- Emission level (dBμV/m) = 20 log Emission level (μV/m)
- Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor
- Corrected Reading: Factor(dB) + Read Level = Level



Trace: (Discrete)

Site : 03CH06-HY
 Condition : FCC CLASS-B 3m 9120D_1212 VERTICAL
 Project : 2N2201-11
 Power : From Battery
 Memo : Mode 1

| | Freq | Level | Over | Limit | Read | Factor | A/Pos | T/Pos | Remark |
|-----|----------|--------|--------|--------|-------|--------|-------|-------|---------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | cm | deg | |
| 1 | 31.62 | 27.26 | -12.74 | 40.00 | 34.50 | -7.24 | --- | --- | Peak |
| 2 | 45.66 | 25.33 | -14.67 | 40.00 | 39.39 | -14.06 | --- | --- | Peak |
| 3 | 69.69 | 19.91 | -20.09 | 40.00 | 37.67 | -17.76 | --- | --- | Peak |
| 4 | 368.60 | 21.85 | -24.15 | 46.00 | 29.61 | -7.76 | --- | --- | Peak |
| 5 | 631.80 | 27.01 | -18.99 | 46.00 | 28.50 | -1.49 | --- | --- | Peak |
| 6 * | 881.70 | 50.69 | | | 48.64 | 2.05 | --- | --- | Peak |
| 7 | 953.10 | 33.10 | -12.90 | 46.00 | 29.04 | 4.06 | --- | --- | Peak |
| 8 | 3000.00 | 42.60 | -31.40 | 74.00 | 64.11 | -21.51 | --- | --- | Peak |
| 9 | 4946.00 | 44.50 | -29.50 | 74.00 | 61.89 | -17.39 | --- | --- | Peak |
| 10 | 6568.00 | 47.51 | -26.49 | 74.00 | 60.85 | -13.34 | --- | --- | Peak |
| 11 | 8872.00 | 33.01 | -20.99 | 54.00 | 43.00 | -9.99 | 100 | 214 | Average |
| 12 | 8872.00 | 48.22 | -25.78 | 74.00 | 58.21 | -9.99 | 100 | 214 | Peak |
| 13 | 9816.00 | 34.29 | -19.71 | 54.00 | 43.31 | -9.02 | 100 | 125 | Average |
| 14 | 9816.00 | 49.78 | -24.22 | 74.00 | 58.80 | -9.02 | 100 | 125 | Peak |
| 15 | 12662.00 | 33.77 | -20.23 | 54.00 | 39.21 | -5.44 | 100 | 85 | Average |
| 16 | 12662.00 | 49.02 | -24.98 | 74.00 | 54.46 | -5.44 | 100 | 85 | Peak |