# RF TEST REPORT

**Report No.: DDT-B25052216-5E01**

| | | |
|---|---|---|
| **Applicant** | : | DORAN MFG, LLC |
| **Applicant Address** | : | 4362 Glendale Milford Rd, Cincinnati OH 45242 United States |
| **Equipment Under Test** | : | Doran TPMS Sensor for Truck |
| **Model No.** | : | 3602, 3603, 3604, 3604AG |
| **Series Model No.** | : | N/A |
| **Trade Mark** | : | DORAN |
| **FCC ID** | : | VZ43604N3 |
| **IC** | : | 12007A-3604N3 |
| **Manufacturer** | : | DORAN MFG, LLC |
| **Manufacturer Address** | : | 4362 Glendale Milford Rd, Cincinnati OH 45242 United States |
| **Issued By** | : | Suzhou Dongdian Testing Service Co., Ltd. |
| **Address** | : | Phase II, No.16 Runsheng Road, Suzhou Industrial Park, Suzhou, People's Republic of China<br>Tel: +86-0512-62531270,<br>E-mail: rui.zhang@dgddt.com,<br>http://www.ddttest.com |

REPORT

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# Test Report Declare

| | | |
|---|---|---|
| **Applicant** | : | DORAN MFG, LLC |
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| **Manufacturer** | : | DORAN MFG, LLC |
| **Address** | : | 4362 Glendale Milford Rd, Cincinnati OH 45242 United States |

**Test Standard Used:**
47 CFR FCC Part 15C(Part 15.231); RSS-210 Issue 11; RSS-GEN Issue 5+ Amendment 1-2019+ Amendment 2-2021
**Test Procedure Used:**
ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024

**We Declare:**
The equipment described above is tested by Suzhou Dongdian Testing Service Co.,Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Suzhou Dongdian Testing Service Co.,Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

**After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above standards.**

| | | | |
|---|---|---|---|
| **Report No:** | DDT-B25052216-5E01 | | |
| **Sample No:** | Y25032216-06 | | |
| **Date of Receipt:** | Jun. 03, 2025 | **Date of Test:** | Jun. 04, 2025 ~ Jun. 10, 2025 |

| Prepared By: | Reviewed By: | Authorized By: |
|---|---|---|
| Bacon Dong | Vane Xia | Leon Wu |
| Bacon Dong/Engineer | Vane Xia/Director | Leon Wu/Director |

Note:
This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Suzhou Dongdian Testing Service Co., Ltd. The results reported herein have been performed in accordance with the laboratory's terms of accreditation.

This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products. This report does not imply that the product(s) has met the criteria for certification.

# Revision History

| Rev. | Revisions | Issue Date | Revised By |
|---|---|---|---|
| --- | Initial issue | Aug. 04, 2025 | |
| | | | |

# 1. Summary of Test Results

## 1.1. Summary of test result

| Test Item | Standard | Result |
|---|---|---|
| Antenna requirement | FCC §15.203<br>RSS-GEN Clause 6.8 | Pass |
| Restricted bands of operation | FCC §15.205，FCC §15.209<br>RSS-GEN Clause 8.10 | Pass |
| Radiated emission limits, general requirements | FCC §15.209<br>FCC §15.231(e)<br>RSS-210 Annex A，A.1.5 | Pass |
| Periodic operation characteristics | FCC §15.231(e)<br>RSS-210 Annex A，A.1.5 | Pass |
| Fundamental frequencies<br>/Field strength limits | FCC §15.231(e)<br>RSS-210 Annex A，A.1.5 | Pass |
| Bandwidth (20dB) | FCC §15.231(c) | Pass |
| 99% Occupied Bandwidth | RSS-210 Annex A，A.1.4<br>RSS-GEN Clause 6.7 | Pass |

# 2. General Test Information

## 2.1. Description of EUT

| | |
|---|---|
| EUT Description | :Doran TPMS Sensor for Truck |
| Model Number | :3602, 3603, 3604, 3604AG |
| HVIN | :3602N3, 3603N3, 3604N3, 3604AGN3 |
| Series Model Number | :N/A |
| Models difference | :3602, 3604-AG are different from the main model 3604 in terms of marking and packaging. 3603 is different from the main model 3604 in terms of shell shape, marking, and packaging. The details see the below table. |
| Trade Mark | :DORAN |
| Serial Number | :N/A |
| Hardware Version | :V1.0 |
| Software Version | :N/A |
| Sample Type | :Vehicle Device |
| Frequency Band | :434.1MHz |
| Number of Channel | :1 Channel |
| Modulation | :FSK |
| Antenna Type | :PCB antenna |
| Power Supply | :3Vdc (internal CR2450HR) |

Note:
1. EUT is the abbreviation of equipment under test.
2. This EUT only support transmit function

## 2.2. Accessories of EUT

| Description of Accessories | Manufacturer | Model number | Description | Remark |
|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A |

## 2.3. Assistant equipment used for test

| Assistant equipment | Manufacturer | Model number | EMC Compliance | SN |
|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A |

## 2.4. Block diagram of EUT configuration for test

EUT

## 2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

| Condition | Normal Condition | Extreme Condition |
|---|---|---|
| Pressure range | 86-106KPa | N/A |
| Relative Humidity | 30-75% | N/A |
| Temperature(℃) | NT: 25℃ | N/A |
| Voltage(V) | NV: 3V | N/A |
| Note:<br>N/A: Not Applicable<br>NV: Normal Voltage<br>LV: Low Extreme Test Voltage<br>HV: High Extreme Test Voltage | NT: Normal Temperature<br>LT: Low Extreme Test Temperature<br>HT: High Extreme Test Temperature | |

## 2.6. Test laboratory

| | |
|---|---|
| Lab Information | Company Name: Suzhou Dongdian Testing Service Co.,Ltd.<br>Address: Phase II, No.16 Runsheng Road, Suzhou Industrial Park, Suzhou, People's Republic of China.<br>Tel: +86-0512-62531270, E-mail: rui.zhang@dgddt.com, http://www.ddttest.com |
| Accreditation Certificate | A2LA (Certificate No.: 7346.01)<br>Suzhou Dongdian Testing Service Co.,Ltd. has been assessed and proved to be in compliance with A2LA.<br>FCC (FCC Designation No.: CN1397)<br>Suzhou Dongdian Testing Service Co.,Ltd. has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.<br>IC (IC Designation No.: 32952; CAB No.:CN0182)<br>Suzhou Dongdian Testing Service Co.,Ltd. has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules. |
| Note 1: All tests measurement facilities use to collect the measurement data are located at Phase II, No.16 Runsheng Road, Suzhou Industrial Park, Suzhou, China.<br>Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.<br>Note 3: The test anechoic chamber in Suzhou Dongdian Testing Service Co.,Ltd had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site. | |

# 3. Test Configuration

## 3.1. Test Mode

During testing, the interface cables and equipment positions were arranged according to standard ANSI C63.10.

All modes were tested in the laboratory, only worst cases shown in below table and recorded in this report.

| Mode | Channel | Frequency | Condition |
|---|---|---|---|
| 1 | N/A | 434.1 MHz | TX mode |

# 4. Equipment Used During Test

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|
| **RF Conducted Test** | | | | | |
| MXG Vector Signal Generator(100kHz-6GHz) | Agilent | N5182A | MY50144775 | 2025/01/23 | 1 Year |
| Spectrum Analyzer(9kHz-40GHz) | R&S | FSV40-N | 101642 | 2025/01/23 | 1 Year |
| Vector Signal Generator(4kHz-7.125GHz) | R&S | SMCV100B | 103781 | 2025/01/23 | 1 Year |
| WIDBAND RADIO COMMUNICATION TESTER | R&S | CMW 500 | 167141 | 2025/01/23 | 1 Year |
| Signal Analyzer(10Hz-26.5GHz) | Keysight | N9020B | MY56080159 | 2025/01/23 | 1 Year |
| RF Control Unit | Tonscend | JS0806-3 | 24A80620795 | 2025/01/23 | 1 Year |
| Signal Generator | R&S | SMF 100A | 101396 | 2025/01/23 | 1 Year |
| Temperature, humidity and pressure recorder | Huahanwei | TH10R | c00286000Ebc | 2025/02/05 | 1 Year |
| Test Software | TONSCEND | JS1120-3 | 3.5.39 | N/A | N/A |
| **Radiated Spurious Emission 3m EMI Chamber** | | | | | |
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Cal.** | **Cal. Interval** |
| EMI Test Receiver | R&S | ESCI7 | 101138 | 2025/01/23 | 1 Year |
| Signal Analyzer | R&S | FSV40 | 101730 | 2025/01/23 | 1 Year |
| Hybrid antenna | TESEQ | CBL6141B | 27421 | 2024/01/10 | 3 Year |
| Horn Antenna | ETS | ETS 3117 | 157735 | 2024/01/19 | 3 Year |
| Pre-Amplifier_HF | COM-MW | DPA8-1000-18000-1012 | 9BH231242575 | 2025/01/23 | 1 Year |
| Low Noise Amplifier | Tonscend | TAP10M1G40N | 806JSAP039904251006 | 2025/04/09 | 1 Year |
| Temperature, humidity and pressure recorder | Huahanwei | TH10R | c0222020002F | 2025/02/05 | 1 Year |
| 3m Anechoic Chamber | CeRuiTong | 3m-SAC | N/A | 2024/05/10 | 3 Year |
| Test software | TONSCEND | JS35-RSE | 5.0.1 | N/A | N/A |

# 5. Measurement uncertainty

| No. | Test Item | Uncertainty |
|---|---|---|
| 1 | RF frequency | ±2.8 % |
| 2 | Radiated RF power | ±1.5 dB |
| 5 | Bandwidth | ±1.9 % |
| 6 | Radiated Emissions | 30MHz-1GHz: ±1.5 dB |
| | | 1GHz-12.75GHz: ±1.9dB |
| | | 12.75GHz-26.5GHz: ±2.1dB |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | | |

# 6. Antenna requirement

## 6.1. Regulation

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

## 6.2. Result

| Test Item | Verdict |
|---|---|
| The equipment meets the requirements | Yes |

# 7. Restricted bands of Operation

## 7.1. Regulation

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

FCC Part 15.205 Restricted bands of operation

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090–0.110 | 16.42–16.423 | 399.9–410 | 4.5–5.15 |
| 0.495–0.505 | 16.69475–16.69525 | 608–614 | 5.35–5.46 |
| 2.1735–2.1905 | 16.80425–16.80475 | 960–1240 | 7.25–7.75 |
| 4.125–4.128 | 25.5–25.67 | 1300–1427 | 8.025–8.5 |
| 4.17725–4.17775 | 37.5–38.25 | 1435–1626.5 | 9.0–9.2 |
| 4.20725–4.20775 | 73–74.6 | 1645.5–1646.5 | 9.3–9.5 |
| 6.215–6.218 | 74.8–75.2 | 1660–1710 | 10.6–12.7 |
| 6.26775–6.26825 | 108–121.94 | 1718.8–1722.2 | 13.25–13.4 |
| 6.31175–6.31225 | 123–138 | 2200–2300 | 14.47–14.5 |
| 8.291–8.294 | 149.9–150.05 | 2310–2390 | 15.35–16.2 |
| 8.362–8.366 | 156.52475–156.52525 | 2483.5–2500 | 17.7–21.4 |
| 8.37625–8.38675 | 156.7–156.9 | 2690–2900 | 22.01–23.12 |
| 8.41425–8.41475 | 162.0125–167.17 | 3260–3267 | 23.6–24.0 |
| 12.29–12.293 | 167.72–173.2 | 3332–3339 | 31.2–31.8 |
| 12.51975–12.52025 | 240–285 | 3345.8–3358 | 36.43–36.5 |
| 12.57675–12.57725 | 322–335.4 | 3600–4400 | Above 38.6 |
| 13.36–13.41 | -- | -- | -- |

RSS-GEN Clause 8.10 Table 7 – Restricted frequency bands*

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090–0.110 | 13.36–13.41 | 608–614 | 8.025–8.5 |
| 0.495–0.505 | 16.42–16.423 | 960–1427 | 9.0–9.2 |
| 2.1735–2.1905 | 16.69475–16.69525 | 1435–1626.5 | 9.3–9.5 |
| 4.125–4.128 | 16.80425–16.80475 | 1645.5–1646.5 | 10.6–12.7 |
| 4.17725–4.17775 | 25.5–25.67 | 1660–1710 | 13.25–13.4 |
| 4.20725–4.20775 | 37.5–38.25 | 1718.8–1722.2 | 14.47–14.5 |
| 5.677–5.683 | 73–74.6 | 2200–2300 | 15.35–16.2 |
| 6.215–6.218 | 74.8–75.2 | 2310–2390 | 17.7–21.4 |

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 6.26775–6.26825 | 108–138 | 2483.5–2500 | 22.01–23.12 |
| 6.31175–6.31225 | 149.9–150.05 | 2655–2900 | 23.6–24.0 |
| 8.291–8.294 | 156.52475–156.52525 | 3260–3267 | 31.2–31.8 |
| 8.362–8.366 | 156.7–156.9 | 3332–3339 | 36.43–36.5 |
| 8.37625–8.38675 | 162.0125–167.17 | 3345.8–3358 | *Above 38.6 |
| 8.41425–8.41475 | 167.72–173.2 | 3500–4400 | -- |
| 12.29–12.293 | 240–285 | 4500–5150 | -- |
| 12.51975–12.52025 | 322–335.4 | 5350–5460 | -- |
| 12.57675–12.57725 | 399.9–410 | 7250–7750 | -- |

* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to § 15.213.

(4) Any equipment operated under the provisions of §§ 15.255 and 15.256 in the frequency band 75–85 GHz, § 15.257 in the 92–95 GHz band or § 15.258.

(5) Biomedical telemetry devices operating under the provisions of § 15.242 of this part are not subject to the restricted band 608–614 MHz but are subject to compliance within the other

restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to § 15.225 are exempt from complying with this section for the 13.36–13.41 MHz band only.

(8) Devices operated in the 24.075–24.175 GHz band under § 15.245 are exempt from complying with the requirements of this section for the 48.15–48.35 GHz and 72.225–72.525 GHz bands only, and shall not exceed the limits specified in § 15.245(b).

(9) Devices operated in the 24.0–24.25 GHz band under § 15.249 are exempt from complying with the requirements of this section for the 48.0–48.5 GHz and 72.0–72.75 GHz bands only, and shall not exceed the limits specified in § 15.249(a).

(10) White space devices operating under subpart H of this part are exempt from complying with the requirements of this section for the 608–614 MHz band.

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of § 15.245 shall not exceed the limits specified in § 15.245(b).

## Result

| Test Item | Verdict |
|---|---|
| The equipment meets the requirements | Yes |

# 8. Radiated Spurious Emission

## 8.1. Regulation limit

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

FCC Part 15.209

| 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 |

FCC Part 15.231(e)

| Fundamental Frequency (MHz) | Field strength of Fundamental (microvolts/meter) | Field strength of spurious emission (microvolts/meter) |
|---|---|---|
| 40.66-40.70 | 1000 | 100 |
| 70-130 | 500 | 50 |
| 130-174 | 500 to 1500 | 50 to 150 |
| 174-260 | 1500 | 150 |
| 260-470 | 1500 to 5000 | 150 to 500 |
| Above 470 | 5000 | 500 |

RSS-210 Annex A · A.1.5 Table A2: Reduced field strength limits for momentarily operated devices

| Fundamental frequency (MHz), excluding restricted frequency bands specified in RSS-Gen | Field strength of the fundamental emissions (μV/m at 3 m) | Field strength of spurious emission (μV/m at 3 m) |
|---|---|---|
| 70-130 | 500 | 50 |
| 130-174 | 500 to 1500 | 50 to 150 |
| 174-260 | 1500 | 150 |
| 260-470 | 1500 to 5000 | 150 to 500 |
| Above 470 | 5000 | 500 |

For the 30MHz-960MHz band, the emission limit of 15.231(e) is higher than the limit of 15.209, so the test results meet the limit requirements of 15.209 and can be considered to meet the emission spurious requirements of 15.231(e).

For the 960MHz -1GHz,1GHz-6GHz band 15.209, the emission limit is higher than the 15.231(e) limit, so the test results that meet the 15.231(e) limit requirements can be considered to meet the 15.209 radiation spurious emission requirements.

For 130-174 MHz: Field strength of spurious emission ( μ V/m) = ((22.73 x f)-2454.55)/10
For 260-470 MHz: Field strength of spurious emission ( μ V/m) = ((16.67 x f)-2833.33)/10
For 434.1 MHz: Field strength of spurious emission ( μ V/m) = ((16.67 x f)-2833.33)/10=440.31 μ V/m=52.9dB μ V/m

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all

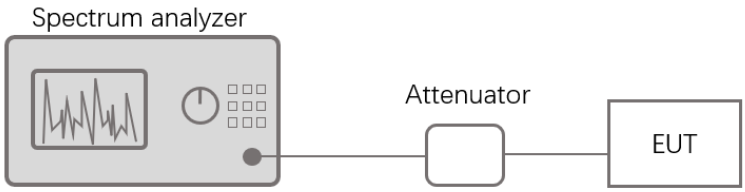
devices operated under this part.

(f) In accordance with § 15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in § 15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in § 15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in § 15.109 that are applicable to the incorporated digital device.

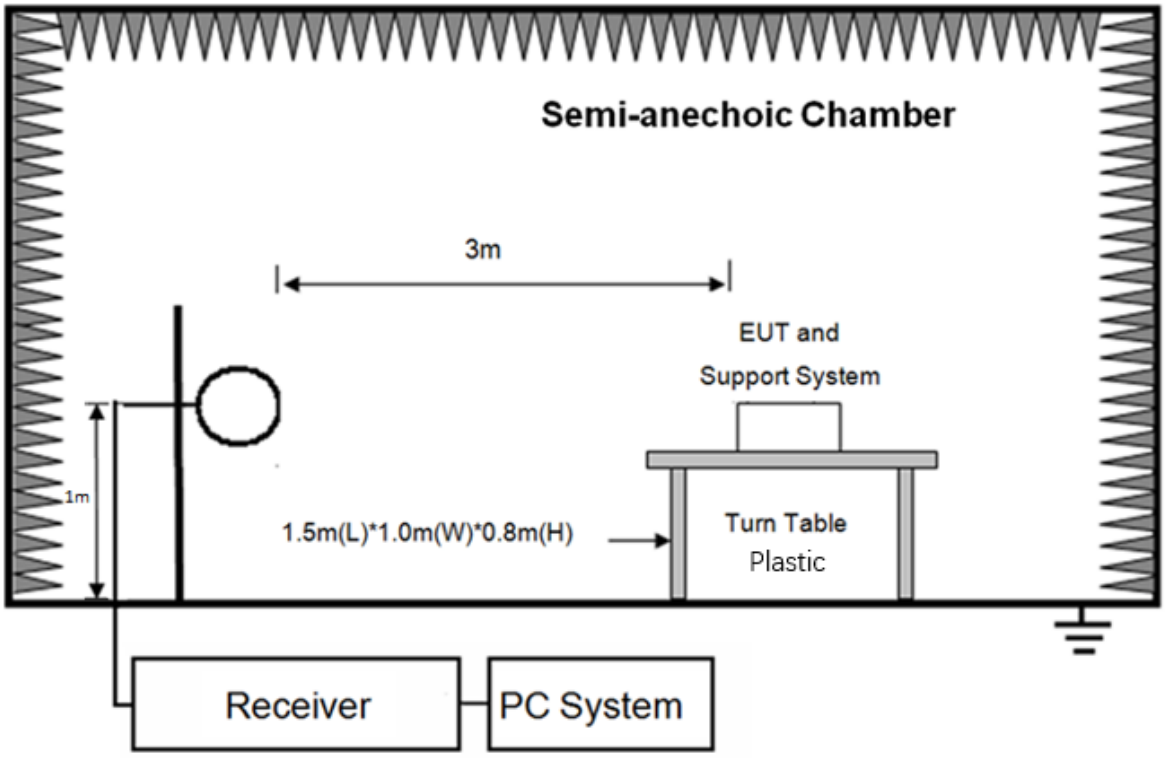
(g) Perimeter protection systems may operate in the 54–72 MHz and 76–88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

## 8.2. Block diagram of test setup

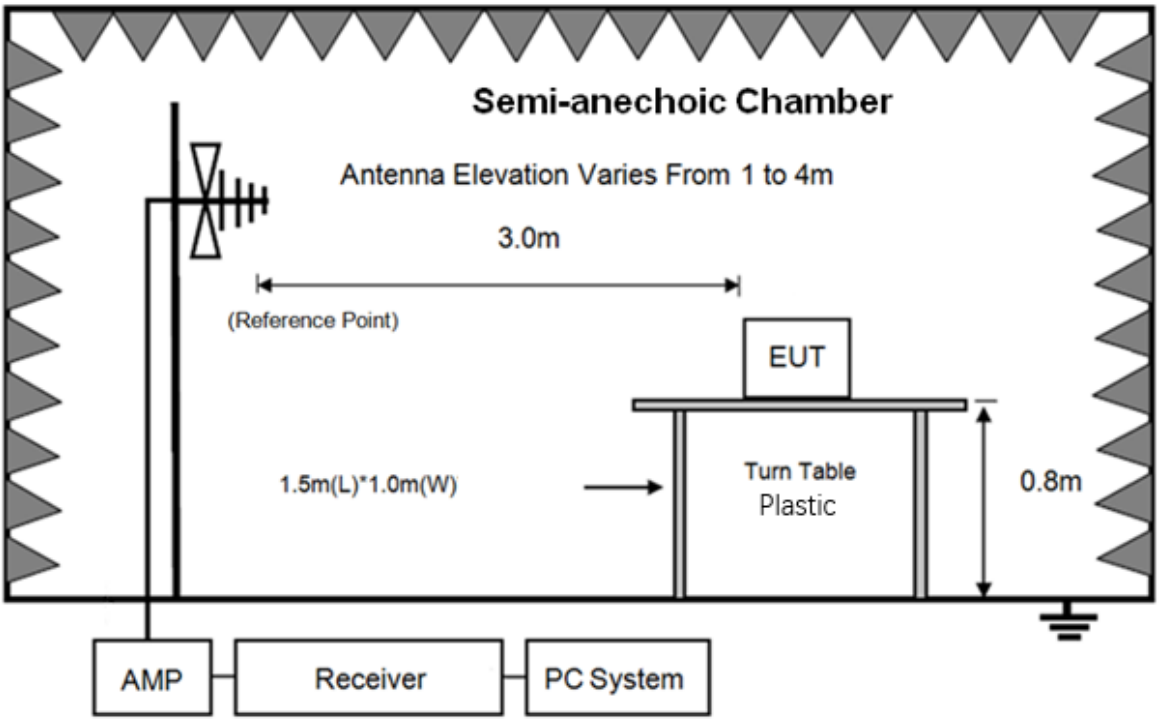
Conducted Measurement Test setup:



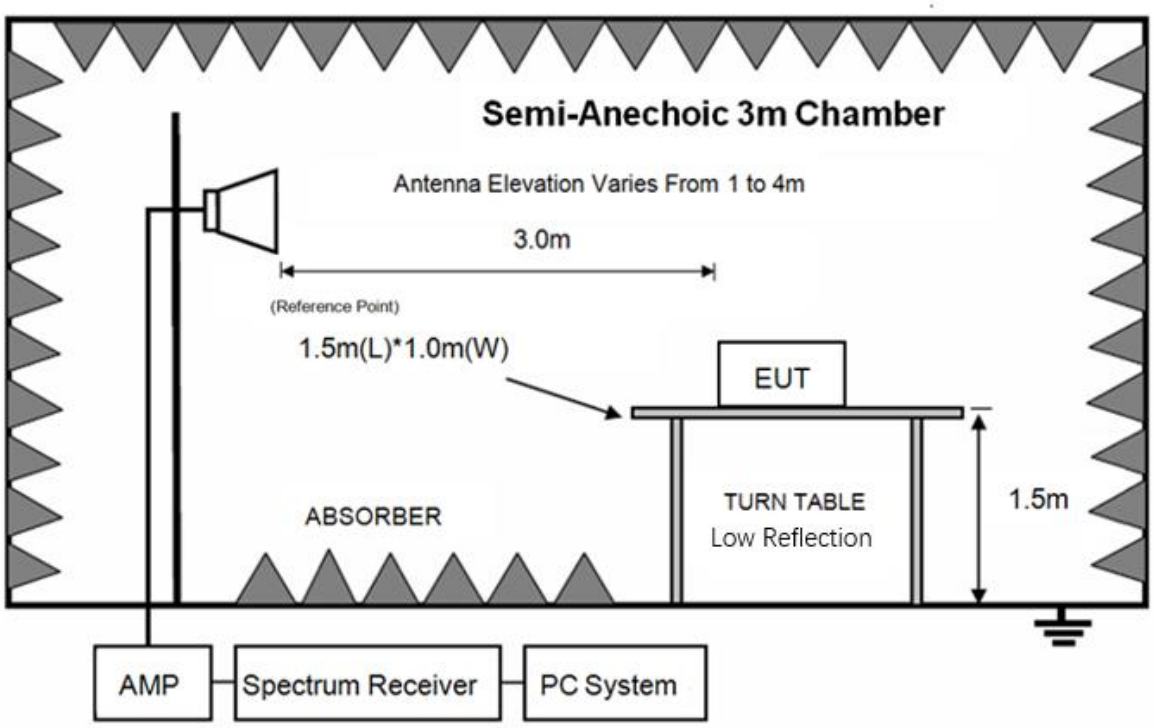

Radiated Measurement Test setup:
In 3 m Anechoic Chamber, test setup diagram for 9 kHz - 30 MHz:




In 3 m Anechoic Chamber, test setup diagram for 30 MHz – 1 GHz:




In 3 m Anechoic Chamber, test setup diagram for frequency above 1 GHz:




## 8.3. Test procedure

The EUT and this peripheral (when additional equipment exists) are placed on a tur table which is 0.8m above the ground. The turn table would be allowed to rotate 360 degrees to determine the position of the maximum emission level. The test distance between the EUT and the receiving antenna are 3m. To find the maximum emission. the polarization of the receiving antenna 1s changed in horizontal and vertical polarization: the position of the EUT was changed indifferent orthogonal determinations.

In the frequency range of 9kHz to 30MHz, magnetic field measurements may be performed. This method is applicable for radiated radio noise from all units, cables, power cords, and interconnect cabling or wiring. A calibrated loop antenna shall be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. For certain applications, the loop antenna may also need to be positioned horizontally at the specified distance from the EUT. The center of the loop shall be 1 m above the ground.

Measurement procedures for electric field radiated emissions above 1 GHz are covered in ANSI C63.10. The ANSI C63.10 measurement procedure consists of both an exploratory test and a final measurement. The exploratory test is critical to determine the frequency of all significant emissions. For each mode of operation required to be tested, the frequency spectrum is monitored. Variations in antenna height, antenna orientation. antenna polarization, EUT azimuth, and cable or wire placement is explored to produce the emission that has the

highest amplitude relative to the limit.

The final measurements are made based on the findings in the exploratory testing. When making exploratory and final measurements it is necessary to maximize the measured radiated emission. The measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." We consider the "cone of radiation" to be the 3 dB beamwidth of the measurement antenna.

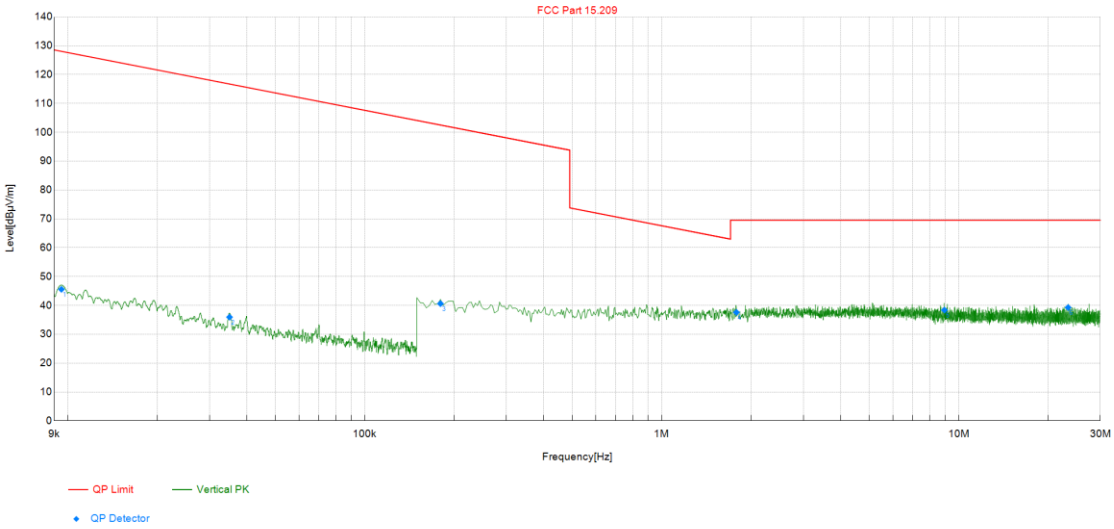
While the "bore-sighting" technique is not explicitly mentioned in ANSI C63.10. it is a useful technique for measurements using a directional antenna, such as a double-ridged waveguide antenna. Several precautions must be observed, including. knowledge of the beamwidth of the antenna and the result illumination area relative to the size of the EUT, estimation for source of the emission and general location within larger EUTS, measuring system sensitivity. Etc.

ANSI C63.10 requires that the measurement antenna 1s kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. That means that if the directional radiation pattern of the EUT results in a maximum emission at an upwards angle from the EUT. when a directional antenna is used to make the measurements it will be necessary for it to be pointed towards the source of the emission within the EUT. This can be done by either pointing the antenna at an angle towards the source of the emission, or by rotating the EUT, in both height and polarization, to maximize the measured emission. The emission must be kept within the illumination area of the 3 dB beamwidth of the antenna so that the maximum emission f om the EUT is measured

| Radiated emissions test characteristics | |
|---|---|
| Frequency range | 30 MHz-4000 MHz |
| Test distance | 3m |
| Test instrumentation resolution bandwidth | 120 KHz (30 MHz-1000 MHz) |
| | 1 MHz (1000 MHz-4000 MHz) |
| Receive antenna scan height | 1m-4m |
| Receive antenna polarization | Vertical / Horizontal |

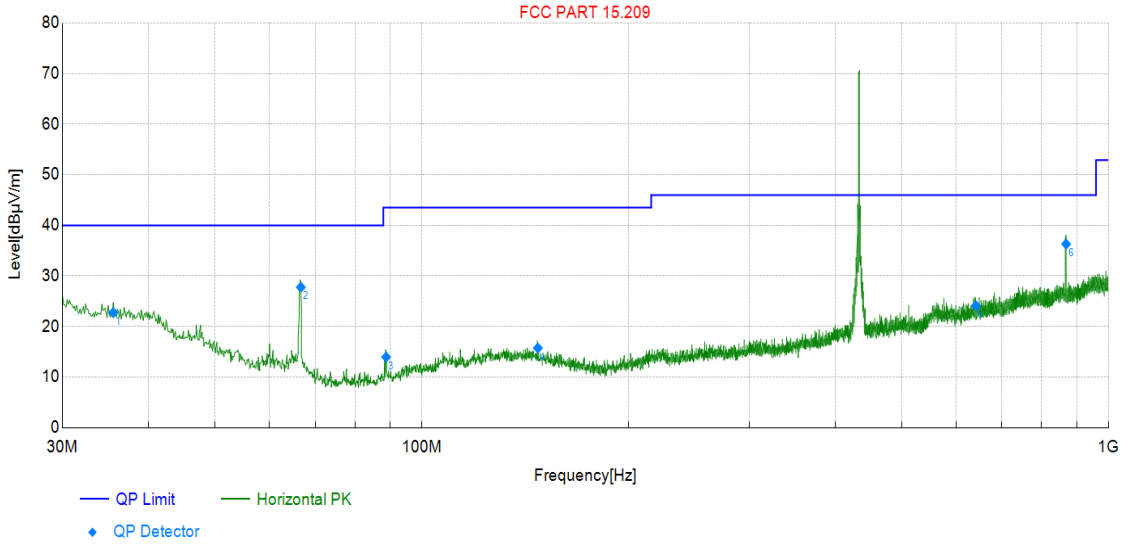
## 8.4. Test result

### Radiated Emission test (9KHz-30MHz)

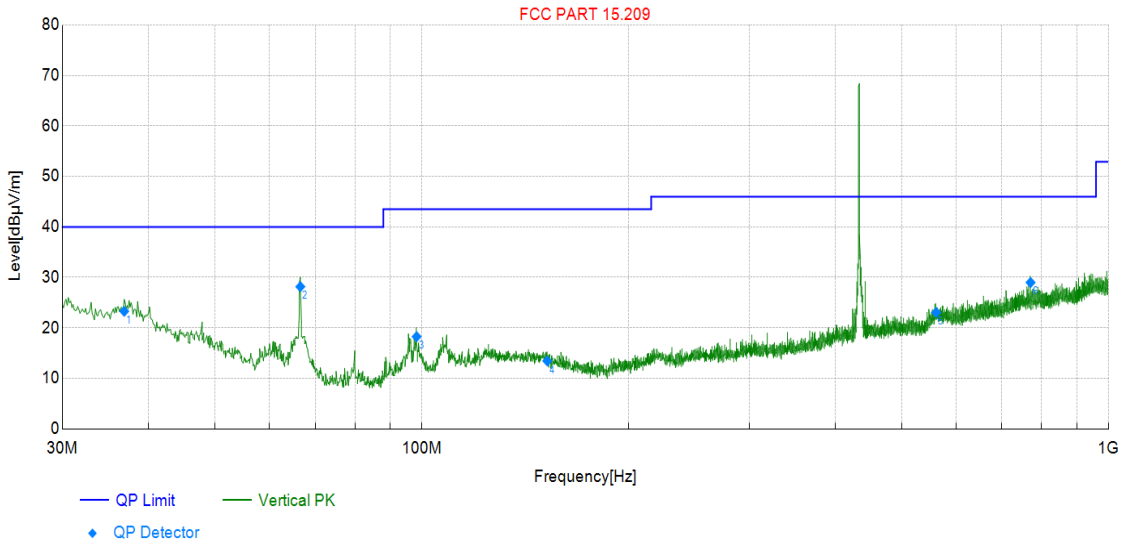



| Final Data List | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Frequency [MHz] | Factor [dB/m] | QP Reading [dBµV] | QP Value [dBµV/m] | QP Limit [dBµV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Pol | Verdict |
| 1 | 0.01 | 21.47 | 24.11 | 45.58 | 128.05 | 82.47 | 100 | 199 | V | PASS |
| 2 | 0.04 | 20.41 | 15.52 | 35.93 | 116.72 | 80.79 | 100 | 360 | V | PASS |
| 3 | 0.18 | 20.30 | 20.32 | 40.62 | 102.50 | 61.88 | 100 | 85 | V | PASS |
| 4 | 1.78 | 20.07 | 17.53 | 37.60 | 69.54 | 31.94 | 100 | 293 | V | PASS |
| 5 | 8.96 | 20.23 | 18.15 | 38.38 | 69.54 | 31.16 | 100 | 14 | V | PASS |
| 6 | 23.37 | 20.22 | 19.06 | 39.28 | 69.54 | 30.26 | 100 | 101 | V | PASS |

## Radiated Emission test (30MHz-1 GHz)

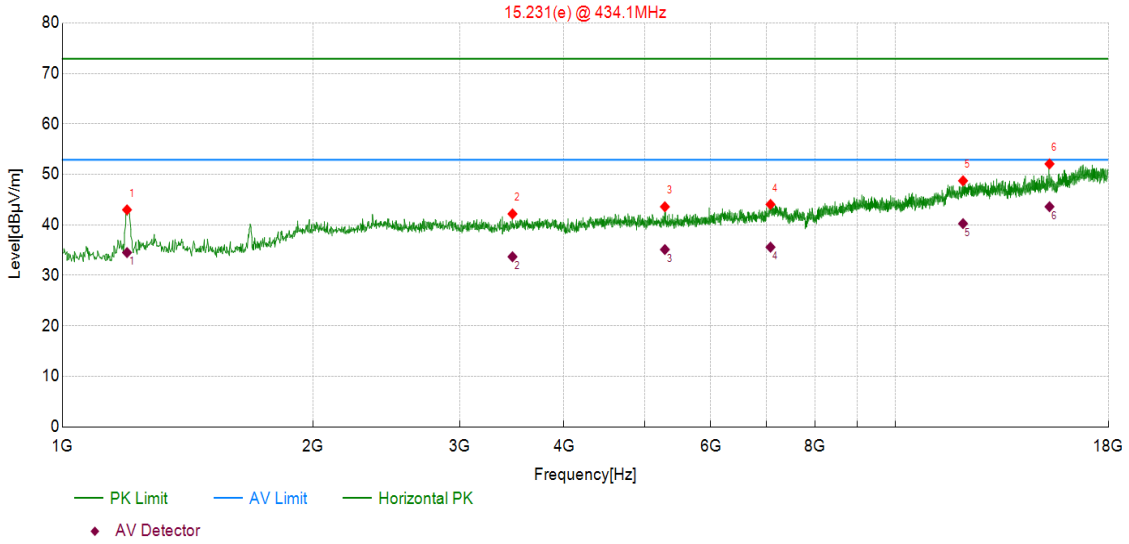



| Final Data List | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Frequency [MHz] | Factor [dB/m] | QP Reading [dBµV] | QP Value [dBµV/m] | QP Limit [dBµV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Pol | Verdict |
| 1 | 35.58 | -16.43 | 39.18 | 22.75 | 40.00 | 17.25 | 100 | 289 | H | PASS |
| 2 | 66.74 | -28.37 | 56.12 | 27.75 | 40.00 | 12.25 | 100 | 210 | H | PASS |
| 3 | 88.81 | -28.13 | 42.09 | 13.96 | 43.50 | 29.54 | 100 | 111 | H | PASS |
| 4 | 147.73 | -23.89 | 39.62 | 15.73 | 43.50 | 27.77 | 100 | 22 | H | PASS |
| 5 | 641.71 | -13.53 | 37.62 | 24.09 | 46.00 | 21.91 | 100 | 3 | H | PASS |
| 6 | 868.32 | -9.55 | 45.85 | 36.30 | 46.00 | 9.70 | 100 | 360 | H | PASS |



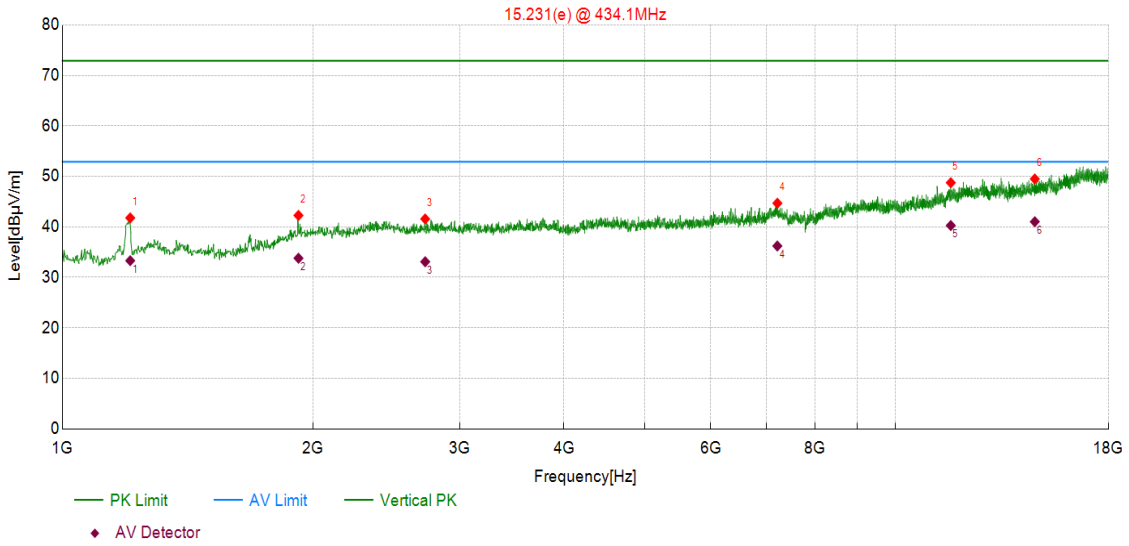

| Final Data List | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Frequency [MHz] | Factor [dB/m] | QP Reading [dBµV] | QP Value [dBµV/m] | QP Limit [dBµV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Pol | Verdict |
| 1 | 36.91 | -16.93 | 40.21 | 23.28 | 40.00 | 16.72 | 100 | 251 | V | PASS |
| 2 | 66.62 | -28.34 | 56.5 | 28.16 | 40.00 | 11.84 | 100 | 300 | V | PASS |
| 3 | 98.39 | -26.84 | 45.1 | 18.26 | 43.50 | 25.24 | 100 | 202 | V | PASS |
| 4 | 152.46 | -24.17 | 37.61 | 13.44 | 43.50 | 30.06 | 100 | 162 | V | PASS |
| 5 | 561.68 | -13.91 | 36.96 | 23.05 | 46.00 | 22.95 | 100 | 192 | V | PASS |
| 6 | 770.72 | -10.91 | 39.9 | 28.99 | 46.00 | 17.01 | 100 | 3 | V | PASS |

Above 1G




| Suspected Data List | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Frequency [MHz] | Reading [dBµV] | Level [dBµV/m] | Factor [dB/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Det | Pol | Verdict |
| 1 | 1195.50 | 62.96 | 43.00 | -19.96 | 72.90 | 29.90 | 100 | 295 | PK | H | PASS |
| 2 | 3469.25 | 54.27 | 42.18 | -12.09 | 72.90 | 30.72 | 200 | 0 | PK | H | PASS |
| 3 | 5286.13 | 51.52 | 43.60 | -7.92 | 72.90 | 29.30 | 200 | 6 | PK | H | PASS |
| 4 | 7077.50 | 48.31 | 44.07 | -4.24 | 72.90 | 28.83 | 200 | 328 | PK | H | PASS |
| 5 | 12050.00 | 46.19 | 48.74 | 2.55 | 72.90 | 24.16 | 100 | 21 | PK | H | PASS |
| 6 | 15303.38 | 46.09 | 52.09 | 6.00 | 72.90 | 20.81 | 200 | 113 | PK | H | PASS |

| Final Data List | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Frequency [MHz] | Factor [dB/m] | AV Reading [dBµV] | AV Value [dBµV/m] | AV Limit [dBµV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Pol | Verdict |
| 1 | 1195.50 | -19.96 | 54.48 | 34.52 | 52.90 | 18.38 | 100 | 295 | H | PASS |
| 2 | 3469.25 | -12.09 | 45.79 | 33.70 | 52.90 | 19.20 | 200 | 0 | H | PASS |
| 3 | 5286.13 | -7.92 | 43.04 | 35.12 | 52.90 | 17.78 | 200 | 6 | H | PASS |
| 4 | 7077.50 | -4.24 | 39.83 | 35.59 | 52.90 | 17.31 | 200 | 328 | H | PASS |
| 5 | 12050.00 | 2.55 | 37.71 | 40.26 | 52.90 | 12.64 | 100 | 21 | H | PASS |
| 6 | 15303.38 | 6.00 | 37.61 | 43.61 | 52.90 | 9.29 | 200 | 113 | H | PASS |




| Suspected Data List | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Frequency [MHz] | Reading [dBµV] | Level [dBµV/m] | Factor [dB/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Det | Pol | Verdict |
| 1 | 1206.13 | 61.52 | 41.79 | -19.73 | 72.90 | 31.11 | 100 | 113 | PK | V | PASS |
| 2 | 1920.13 | 57.69 | 42.28 | -15.41 | 72.90 | 30.62 | 100 | 277 | PK | V | PASS |
| 3 | 2725.50 | 55.04 | 41.58 | -13.46 | 72.90 | 31.32 | 200 | 327 | PK | V | PASS |
| 4 | 7213.50 | 49.08 | 44.70 | -4.38 | 72.90 | 28.20 | 100 | 184 | PK | V | PASS |
| 5 | 11648.38 | 47.00 | 48.76 | 1.76 | 72.90 | 24.14 | 200 | 2 | PK | V | PASS |
| 6 | 14693.50 | 44.02 | 49.51 | 5.49 | 72.90 | 23.39 | 100 | 0 | PK | V | PASS |

| Final Data List | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Frequency [MHz] | Factor [dB/m] | AV Reading [dBµV] | AV Value [dBµV/m] | AV Limit [dBµV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Pol | Verdict |
| 1 | 1206.13 | -19.73 | 53.04 | 33.31 | 52.90 | 19.59 | 100 | 113 | V | PASS |
| 2 | 1920.13 | -15.41 | 49.21 | 33.80 | 52.90 | 19.10 | 100 | 277 | V | PASS |
| 3 | 2725.50 | -13.46 | 46.56 | 33.10 | 52.90 | 19.80 | 200 | 327 | V | PASS |
| 4 | 7213.50 | -4.38 | 40.6 | 36.22 | 52.90 | 16.68 | 100 | 184 | V | PASS |
| 5 | 11648.38 | 1.76 | 38.52 | 40.28 | 52.90 | 12.62 | 200 | 2 | V | PASS |
| 6 | 14693.50 | 5.49 | 35.54 | 41.03 | 52.90 | 11.87 | 100 | 0 | V | PASS |

# 9. Periodic operation characteristics

## 9.1. Regulation

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

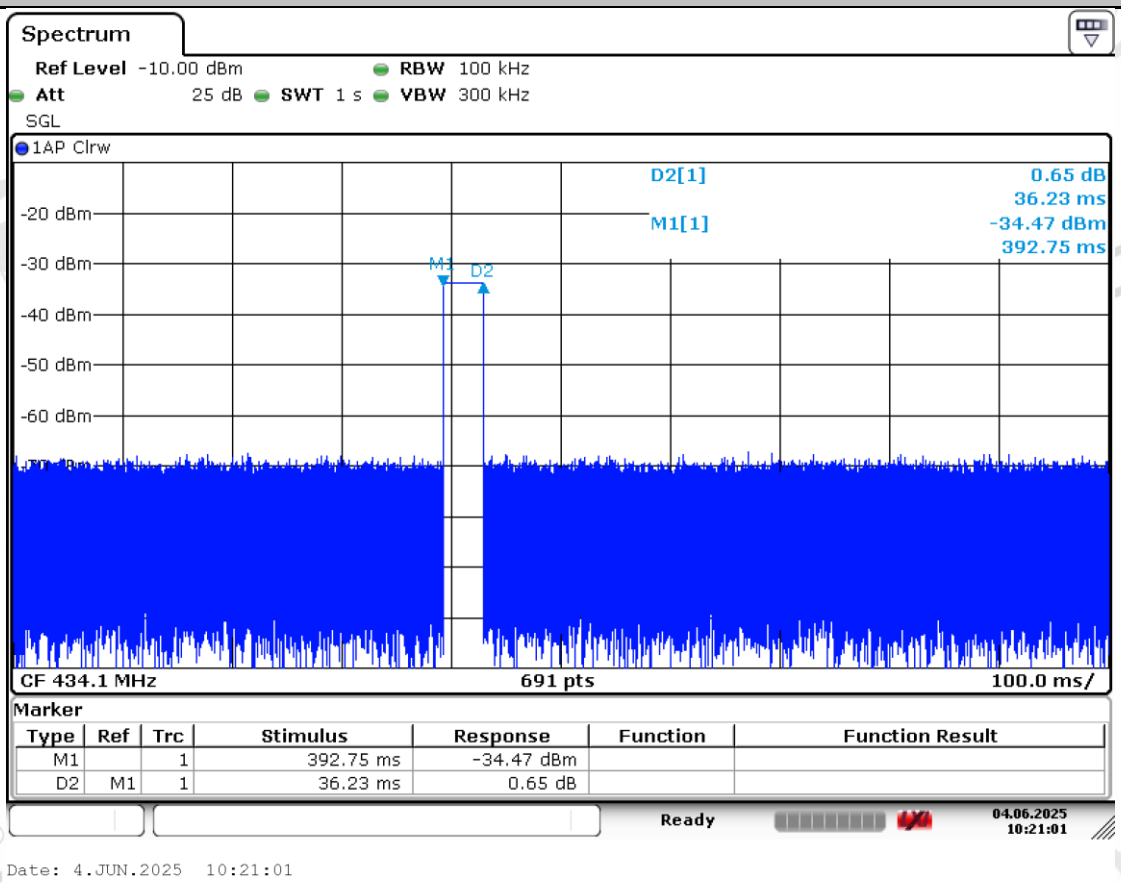
## 9.2. Result

The intentional radiator complies with the provisions of paragraph (e) of FCC CFR § 15.231.

| Modulation | Transmission Time Result (s) | Silent period Result (s) | Transmission Time Limit (s) | Silent period Limit (s) | Result |
|---|---|---|---|---|---|
| FSK | 0.03623 | 11.3623 | 1 | 10 | Pass |

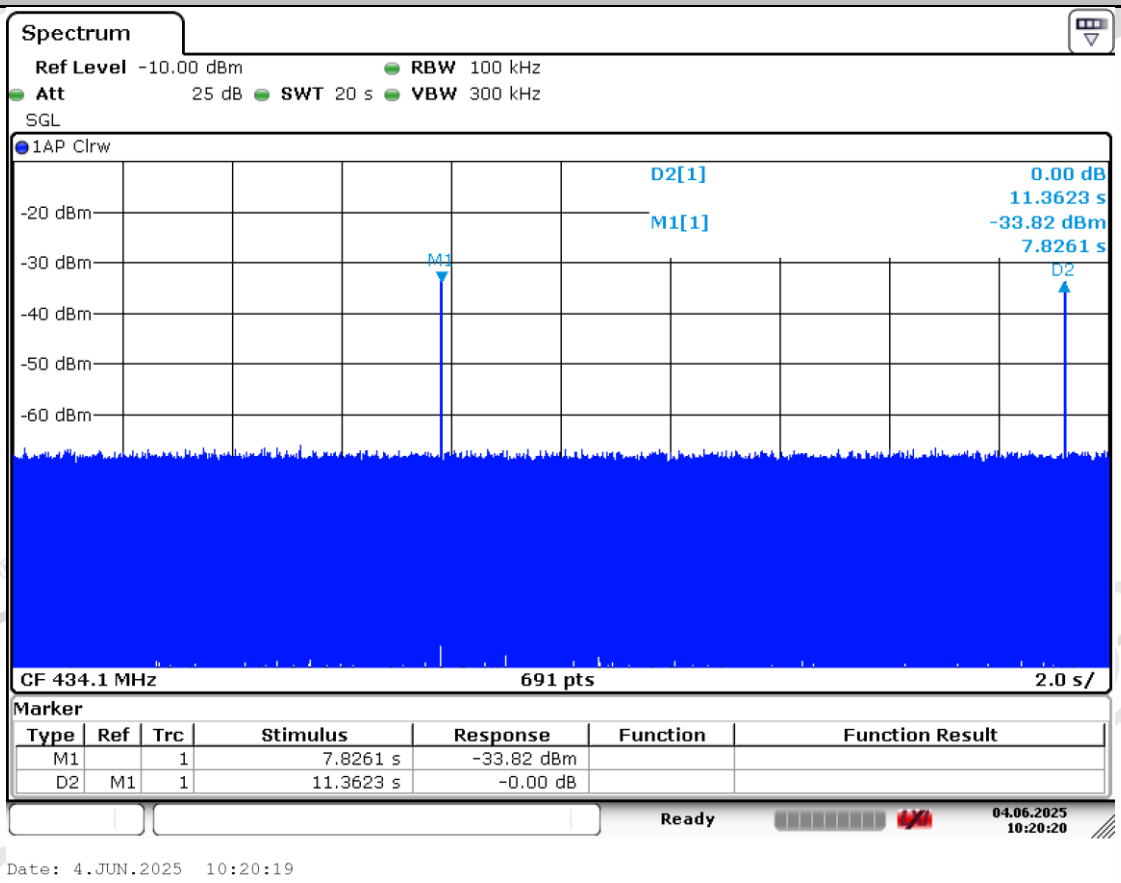
Note: Transmission time= T1 =36.23ms

Transmission time




T1

Silent period



# 10. Fundamental frequencies/Field strength

## 10.1. Regulation limit

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

| Fundamental Frequency (MHz) | Field strength of Fundamental (microvolts/meter) | Field strength of spurious emission (microvolts/meter) |
|---|---|---|
| 40.66-40.70 | 1000 | 100 |
| 70-130 | 500 | 50 |
| 130-174 | 500 to 1500 | 50 to 150 |
| 174-260 | 1500 | 150 |
| 260-470 | 1500 to 5000 | 150 to 500 |
| Above 470 | 5000 | 500 |

#Linear interpolation with frequency, f, in MHz:

For 130-174 MHz: Field Strength ( μ V/m) = (22.73 x f)-2454.55
For 260-470 MHz: Field Strength ( μ V/m) = (16.67 x f)-2833.33

## 10.2. Block diagram of test setup

Refer to 8.2.

## 10.3. Test procedure

The EUT and this peripheral (when additional equipment exists) are placed on a tum table which is 0.8m above the ground. The turn table would be allowed to rotate 360 degrees to determine the position of the maximum emission level. The test distance between the EUT and the receiving antenna are 3m. To find the maximum emission, the polarization of the receiving antenna are changed in horizontal and vertical polarization. the position of the EUT was changed indifferent orthogonal determinations.

Measurement procedures for electric field radiated emissions above 30MHz below 1 GHz are covered in ANSI C63.10. The ANSI C63.10 measurement procedure consists of both an exploratory test and a final measurement. The exploratory test is critical to determine the frequency of all significant emissions. For each mode of operation required to be tested, the frequency spectrum is monitored. Variations in antenna height, antenna orientation. antenna polarization, EUT azimuth, and cable or wire placement is explored to produce the emission that

has the highest amplitude relative to the limit.

The final measurements are made based on the findings in the exploratory testing. When making exploratory and final measurements it 1s necessary to maximize the measured radiated emission. ANSI C63.10 states that the measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." We consider the “*cone of radiation” to be the 3 dB beamwidth of the measurement antenna.

While the "bore-sighting" technique is not explicitly mentioned in ANSI C63.10, it is a useful technique for measurements using a directional antenna, such as a double-ridged waveguide antenna. Several precautions must be observed. including: knowledge of the beamwidth of the antenna and the resulting illumination area relative to the size of the EUT, estimation for source of the emission and general location within larger EUTS, measuring system sensitivity. etc.

ANSI C63.10 requires that the measurement antenna is kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. That means that if the directional radiation pattern of the EUT results in a maximum emission at an upwards angle from the EUT, when a directional antenna 1s used to make the measurement it will be necessary for it to be pointed towards the source of the emission within the EUT. This can be done by either pointing the antenna at an angle towards the source of the emission. or by rotating the EUT. in both height and polarization. to maximize the measured emission The emission must be kept within the illumination area of the 3 dB beamwidth of the antenna so that the maximum emission from the EUT is measured

when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ms). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval. The following procedure is an example of how the average value may be determined. The average field strength may be found by measuring the peak pulse amplitude (in log equivalent units) and determining the duty cycle correction factor (in dB) associated with the pulse modulation as shown in Equation:

$$\delta(\mathrm{dB}) = 20\log(\Delta)$$

where

$\delta$ is the duty cycle correction factor (dB)
$\Delta$ is the duty cycle (dimensionless)

This correction factor may then be subtracted from the peak pulse amplitude (in dB) to find the

average emission. This correction may be applied to all emissions that demonstrate the same pulse timing characteristics as the fundamental emission (e.g., the fundamental and harmonic emissions). In cases where the pulse train is truly random or pseudo random, some regulatory agencies might accept a declaration by the manufacturer of the worst-case value of $t_{ON}$. The duty cycle correction is determined as follows:

a) Adjust and configure any EUT switches, controls, or input data streams to ensure that the EUT is transmitting or encoded to obtain the “worst-case” pulse ON time.

b) Couple the final radio frequency output signal to the input of a spectrum analyzer. This may be performed by a radiated, direct connection (i.e., conducted) or by a “near-field” coupling method. The signal received shall be of sufficient level to trigger adequately the spectrum analyzer sweep display.

NOTE—If the bandwidth of the pulse is greater than the RBW of the spectrum analyzer, then a similar measurement may be performed using a wideband digital storage oscilloscope (DSO).

c) Adjust the center frequency of the spectrum analyzer to the center of the RF signal.

d) Set the spectrum analyzer for ZERO SPAN.

e) Adjust the SWEEP TIME to obtain at least a 100 ms period of time on the horizontal display axis of the spectrum analyzer.

f) If the pulse train is periodic (i.e., consists of a series of pulses that repeat in a characteristic pattern over a constant time period), and the period (T) is less than or equal to 100 ms, then:

1) Set the TRIGGER on the spectrum analyzer to capture at least one period of the pulse train, including any blanking intervals.

2) Determine the total maximum pulse “ON time” ($t_{ON}$) over one period of the pulse train. If the pulse train contains pulses of different widths, then $t_{ON}$ is determined by summing the duration of all of the pulses within the pulse train [i.e., $t_{ON} = \Sigma(t1 + t2 + \ldots tn)$].

3) The duty cycle is then determined by dividing the total maximum “ON time” by the period of the pulse train ($t_{ON}/T$).

g) If the pulse train is nonperiodic or is periodic with a period that exceeds 100 ms, or as an alternative to step f), then:

1) Set the TRIGGER on the spectrum analyzer to capture the greatest amount of pulse “ON time” over 100 ms.

2) Find the 100 ms period that contains the maximum “on time”; this could require summing the duration of multiple pulses as described in step f2).

3) Determine the duty cycle by dividing the total maximum “ON time” by 100 ms ($t_{ON}$/100 ms).

$$\delta(\mathrm{dB}) = 20\log\left[\sum\left(nt_1 + mt_2 + \ldots + \xi t_x\right)/T\right]$$

n is the number of pulses of duration t1

m is the number of pulses of duration t2

ξ is the number of pulses of duration tx

T is the period of the pulse train, or 100 ms if the pulse train length is greater than 100 ms

## 10.4. Test result

| Item (Mark) | Freq. (MHz) | Result Level (PK) (dBµV/m) | Result Level (AV) (dBµV/m) | Limit Line (PK) (dBµV/m) | Limit Line (AV) (dBµV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1 | 434.1 | 59.74 | 50.92 | 92.9 | 72.9 | 21.98 | PK | H |
| 2 | 434.1 | 70.62 | 61.80 | 92.9 | 72.9 | 11.10 | PK | V |

Note:

Calculate Average value based on Duty Cycle correction factor:

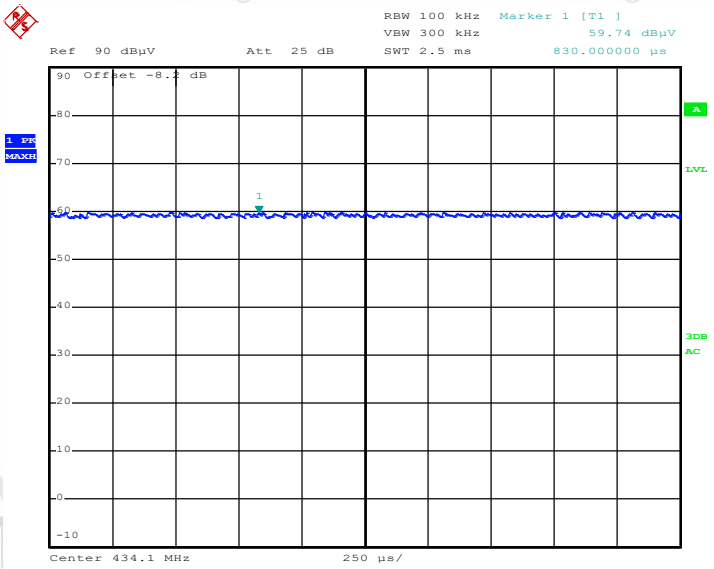
Ton = T1=ms=36.23ms

Tp=100ms

duty cycle factor=20*log(Ton/Tp)= 20*log(36.23ms/100ms)= -8.82dB

**Test Result**

H

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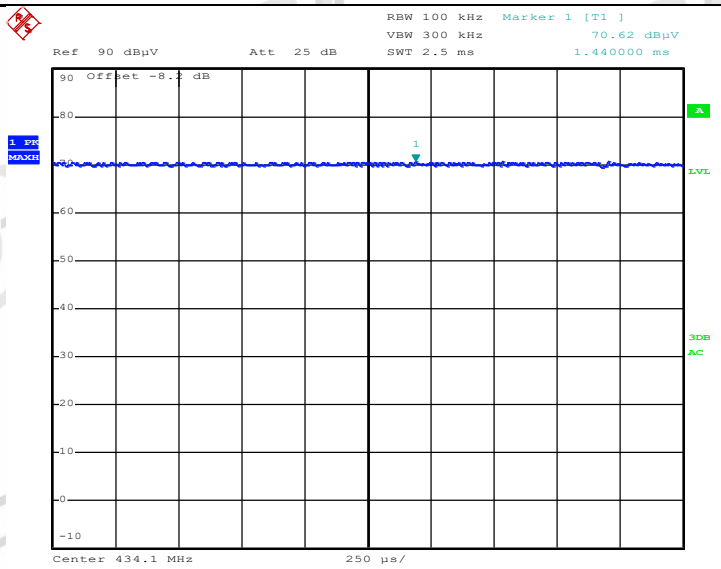
V

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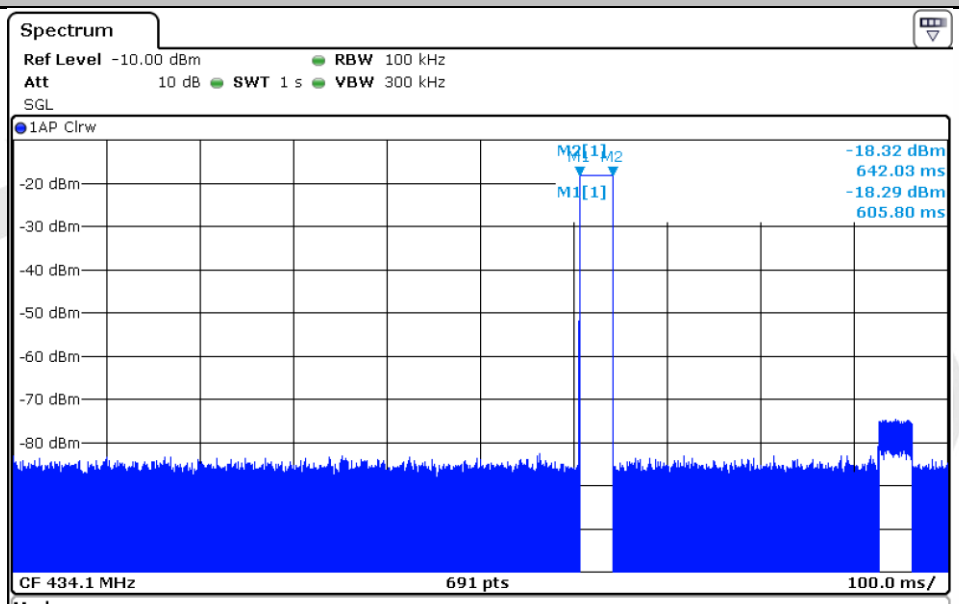
## Duty Cycle




Marker

| Type | Ref | Trc | Stimulus | Response | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 605.8 ms | -18.29 dBm | | |
| M2 | | 1 | 642.03 ms | -18.32 dBm | | |

# 11. Bandwidth(20dB)

## 11.1. Regulation

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz, For devices operating above 900 MHz. the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

## 11.2. Calculation of the 20dB bandwidth limit

The 20 dB bandwidth limit = 0.0025 * 434.1 MHz = 1.08525 MHz = 1085.25 kHz

## 11.3. Test Procedure

A dBc bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). Typical ratios, expressed in dB, are −6 dB, −20 dB, and −26 dB, corresponding to 6 dB BW, 20 dB BW, and 26 dB BW, respectively. In this subclause, the ratio is designated by “−xx dB.” The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements might specify a specific maximum or minimum value for the “−xx dB” bandwidth; other requirements might specify that the “−xx dB” bandwidth be entirely contained within the authorized or designated frequency band

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be at least three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “−xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max-hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

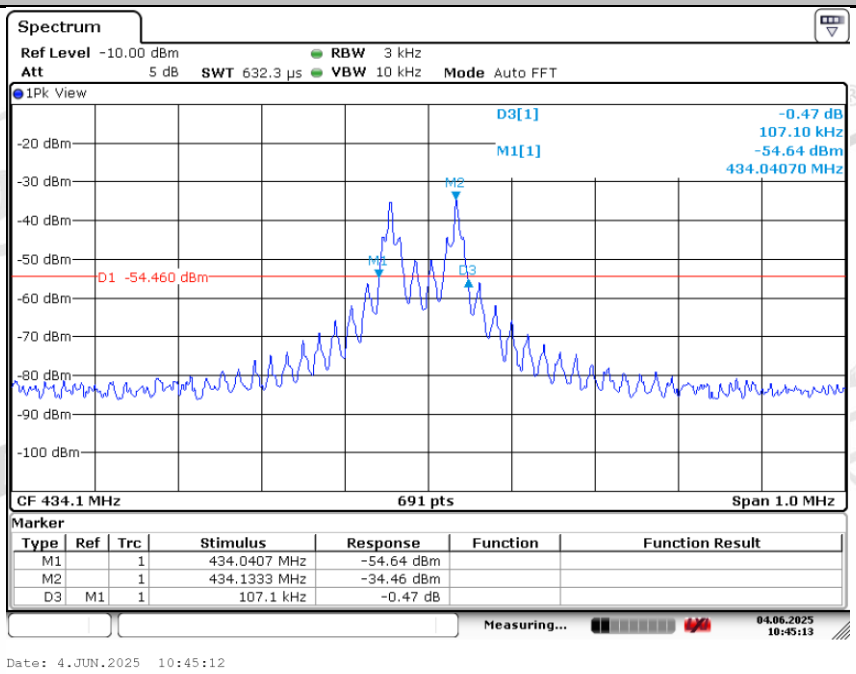
h) Determine the “−xx dB down amplitude” using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “−xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The dBc bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “−xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.
k) The dBc bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

## 11.4. Test result

| Modulation | $F_L$ Result (MHz) | $F_H$ Result (MHz) | Limit Low (MHz) | Limit high (MHz) | Bandwidth Result (kHz) | Bandwidth Limit (kHz) | Result |
|---|---|---|---|---|---|---|---|
| FSK | 434.0407 | 434.1478 | 433.01475 | 435.18525 | 107.1 | 1085.25 | PASS |

Note: The EUT is not capable of producing an unmodulated carrier.

## 20dB Bandwidth



# 12. Bandwidth(99%)

## 12.1. Regulation

The occupied bandwidth of momentarily operated devices shall be less than or equal to 0.25% of the center frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the occupied bandwidth shall be less than or equal to 0.5% of the center frequency.

## 12.2. Calculation of the 99% bandwidth limit

The 99% bandwidth limit = 0.0025 * 434.1 MHz = 1.08525 MHz = 1085.25kHz

## 12.3. Test Procedure

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be at least three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max-hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

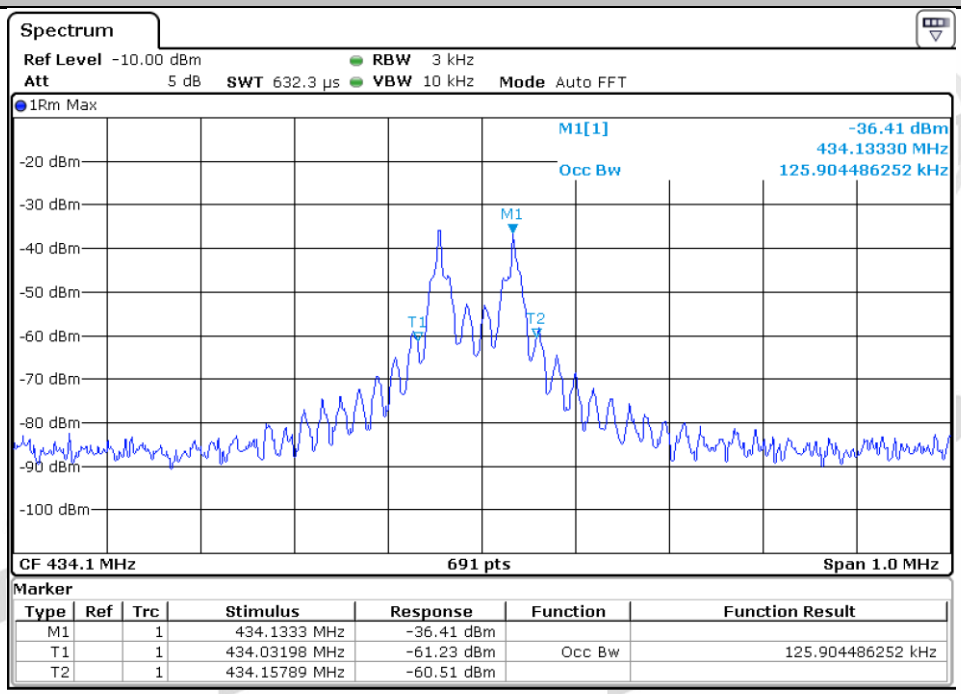
h) The occupied bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

## 12.4. Test result

| Modulation | $F_L$ Result (MHz) | $F_H$ Result (MHz) | Limit Low (MHz) | Limit high (MHz) | Bandwidth Result (kHz) | Bandwidth Limit (kHz) | Result |
|---|---|---|---|---|---|---|---|
| FSK | 434.03198 | 434.15789 | 433.5574 | 434.6426 | 125.904 | 1085.25 | Pass |

Note: The EUT is not capable of producing an unmodulated carrier.

99% Occupied _ Bandwidth



## 13. Photos of the EUT

Please refer to the appendix A.

## 14. Photos of the Setup

Please refer to the appendix B.

**END REPORT**