

Global EMC Inc. Labs

EMC & RF Test Report

As per

RSS 210 Issue 8

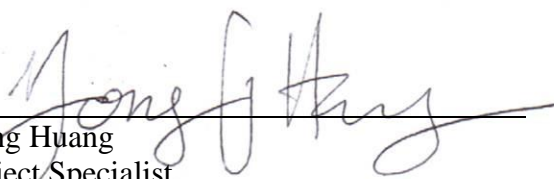
&

FCC Part 15 Subpart C

Unlicensed Intentional Radiators

on the

XH2296



Yong Huang
Project Specialist
Global EMC Inc. Laval
2972 Joseph-A-Bombardier
Laval, QC, H7P 6E3 CANADA
Ph: (450) 687- 4976

Testing produced for



See Appendix A for full customer & EUT details.





| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Table of Contents

| | |
|---|----|
| Table of Contents | 2 |
| Report Scope..... | 3 |
| Summary | 4 |
| Test Results Summary | 5 |
| Justifications, Descriptions, or Deviations..... | 7 |
| Applicable Standards, Specifications and Methods..... | 8 |
| Sample calculation(s)..... | 9 |
| Document Revision Status..... | 9 |
| Definitions and Acronyms | 10 |
| Testing Facility | 11 |
| Calibrations and Accreditations..... | 11 |
| Testing Environmental Conditions and Dates | 12 |
| Detailed Test Results Section | 13 |
| 20 dB Bandwidth of Periodically Operated Transmitters..... | 14 |
| Radiated Emissions of Fundamental..... | 17 |
| Unintentional Radiated Emissions and Spurious Emissions | 26 |
| Appendix A – EUT Summary..... | 39 |
| Appendix B – EUT and Test Setup Photographs..... | 41 |

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Report Scope

This report addresses the EMC verification testing and test results of the XH2296, herein referred to as EUT (Equipment Under Test) performed at Global EMC Labs.

The EUT was tested for compliance against the following standards:


RSS 210 Issue 8/ FCC Part 15 Subpart C 15

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

The results contained in this report relate only to the item(s) tested.

This report does not imply product endorsement by A2LA or any other accreditation agency, any government, or Global EMC Inc.


Opinions/interpretations expressed in this report, if any, are outside the scope of Global EMC Inc accreditation. Any opinions expressed do not necessarily reflect the opinions of Global EMC Inc, unless otherwise stated.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Summary


The results contained in this report relate only to the item(s) tested.

| | |
|--|--------------------------------|
| EUT FCC Certification #, FCC ID: | 2ACKU-R2W02FM |
| EUT Industry Canada Certification #, IC: | 12084A-R2W02FM |
| EUT Passed all tests performed. | Yes (see test results summary) |
| Tests conducted by | Yong Huang |

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Test Results Summary

| Standard/Method | Description | Class/Limit | Result |
|---|--|--|---------------------------|
| FCC 15.203 | Antenna Requirement | Unique | Pass See Justification |
| FCC 15.205 RSS 210 (Table 1) | Restricted Bands for intentional operation | QuasiPeak Average | Pass |
| FCC 15.207 | Power line conducted emissions | QuasiPeak Average | See Justification |
| FCC 15.209 RSS-210 (Table 2) FCC 15.231(b) RSS-210 (Table 4) | Intentional / Spurious Radiated emissions | QuasiPeak Average | Pass |
| FCC 15.231(a) RSS-210 A1.1 | Type of transmission | Not a continuous transmissions, voice, video or radio control of toys. | Pass See Justification |
| FCC 15.231 (a)(1) RSS-210 A1.1.1(a) | Manual transmission Release holdover | < 5 seconds | Pass See Justification |
| FCC 15.231 (a)(2) RSS-210 A1.1.1(b) | Automatic transmission Transmission time | < 5 seconds | Pass See Justification |
| FCC 15.231 (a)(3) RSS-210 A1.1.1(c) | Predetermined intervals Transmission | None | Pass See Justification |
| FCC 15.231 (a)(3) RSS-210 A1.1.1(c) | Predetermined intervals Transmission Security/Safety | < 2 seconds per hour | Pass See Justification |
| FCC 15.231 (c) RSS-210 A1.1.3 | 20 dB Bandwidth | < 0.25% of carrier | Pass |
| Overall Result | | | PASS |

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

All tests were performed by Yong Huang.

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties. A 'PASS' / 'FAIL' grade within measurement uncertainty is marked with a '*'.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Justifications, Descriptions, or Deviations

The following justifications for tests not performed or deviations from the above listed specifications apply:

For the Antenna requirement specified in FCC 15.203 (RSS 210 section 5.5), this device is designed with an integral antenna or proprietary antenna connector which meets the requirements of FCC 15.203.

For the Restricted Bands of operation as specified in FCC 15.205, the EUT is designed to only operate at 433.92 MHz

For the scope of this test report, radiated testing of the EUT was pre-scanned in three orthogonal axis to maximize emissions. Maximum emissions were found in the vertical EUT polarization. This setup was used for all testing in this report.


For the power line conducted emissions requirements, the EUT is DC powered, and this test does not apply.

The type of transmission is a data signal sent with a control signal, which complies with the requirements of 15.231(a) / 15.231(e).

The manual transmission (achieved by pressing the learn button), release holdover time was verified to be for all practical circumstances, instantaneous. This is significantly less than the 5 second requirement.


The EUT transmits a pulse to a receiver unit each time it detects the presence of a current, and another when the current is removed. This transmission does not occur continuously, only enough to signal the receiver of the presence of a current. For the purpose of determining compliance with FCC 15.231(a)(1) or FCC 15.231(a)(2), this transmission is 9.66 milliseconds, and does not transmit for the entire duration of the sensed current. For the purpose of average duty cycle calculations, the maximum time to which this could repeat is over 100 milliseconds. The duty cycle average factor is calculated at $20 \log(9.66/100 \text{ dB}) = -20.3 \text{ dB}$.

For 15.231(a)(3) compliance, this device does not transmit at pre-determined intervals. This device requires end-user motion to trigger the transmit function

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Applicable Standards, Specifications and Methods

- ANSI C63.4:2009 - Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
- CFR 47 FCC 15 - Code of Federal Regulations – Radio Frequency Devices
- CISPR 22:2008 - Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
- ICES-003:2012 - Digital Apparatus - Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard
- ISO 17025:2005 - General Requirements for the competence of testing and calibration laboratories
- RSS 210:2010 - Issue 8: Spectrum Management and Telecommunications Policy. Radio Standards Specification Low Power Licence-Exempt Radio communication Devices

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Sample calculation(s)

Margin = limit – (received signal + antenna factor + cable loss – pre-amp gain)


Margin = 50.5dBuV/m – (50dBuV + 10dB + 2.5dB – 20dB)

Margin = 8.5 dB

Document Revision Status

Revision 1 - Released on June 20th, 2014

Revision 2 - Revised on June 27th, 2014, according to TCB/FCC requirement.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

AE – Auxillary Equipment.

BW – Bandwidth. Unless otherwise stated, this is refers to the 6 dB bandwidth.

EMC – Electro-Magnetic Compatibility

EMI – Electro-Magnetic Immunity

EUT – Equipment Under Test

ITE – Information Technology Equipment with a primary function(s) of entry, storage, display, retrieval, transmission, processing, switching, or control, of data.

LISN – Line impedance stabilization network

NCR – No Calibration Required

RF – Radio Frequency


| | | |
|-------------|---|--|
| Client | Fortin Auto Radio Inc. | |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Testing Facility

Testing for EMC on the EUT was carried out at Global EMC labs in Montréal, Québec, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on an EUT with a maximum width or length of up to 2m and height up to 3m. The chamber is equipped with a turn table that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120 Vac and 240Vac single phase, or 208 Vac 3 phase input. DC capability is also available. The chamber is equipped with an antenna mast that controls polarization and height from the control room adjoining the shielded chamber. Radiated emissions measurements are performed using a Bilog, and Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN.

Calibrations and Accreditations


The measurement site used is registered with Federal Communications Commission (FCC) and Industry Canada (IC). This site is calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The semi-anechoic chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Testing Environmental Conditions and Dates

Following were the environmental conditions in the facility during time of testing –

| Date | Test | Init. | Temperature (°C) | Humidity (%) | Pressure (kPa) |
|-------------|-------------|--------------|-------------------------|---------------------|-----------------------|
| 2014.06.11 | All | YH | 20-25°C | 30-45% | 100 -103kPa |

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Detailed Test Results Section

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

20 dB Bandwidth of Periodically Operated Transmitters

Purpose

The purpose of this test is to ensure that the bandwidth occupied does not exceed a stated minimum. This helps ensure the utilization of the frequency allocation is sufficiently narrow, and not occupying excessive spectrum. This also helps prevent accidentally interference of data by ensuring adequate data separation to distinguish the reception of the intended information by enabling the receiver to have a relatively narrow band response tuned to the transmitters frequency.


Limits

The Limit is as specified in FCC Part 15 and RSS 210.

For periodic transmitters below 900 MHz, this should not exceed 0.25 % of the fundamental frequency. For periodic transmitters above 900 MHz, this should not exceed 0.5 % of the fundamental frequency. This should be measured with a RBW equal to approximately %1 of the 20 dB BW of the signal and a VBW > then the RBW.

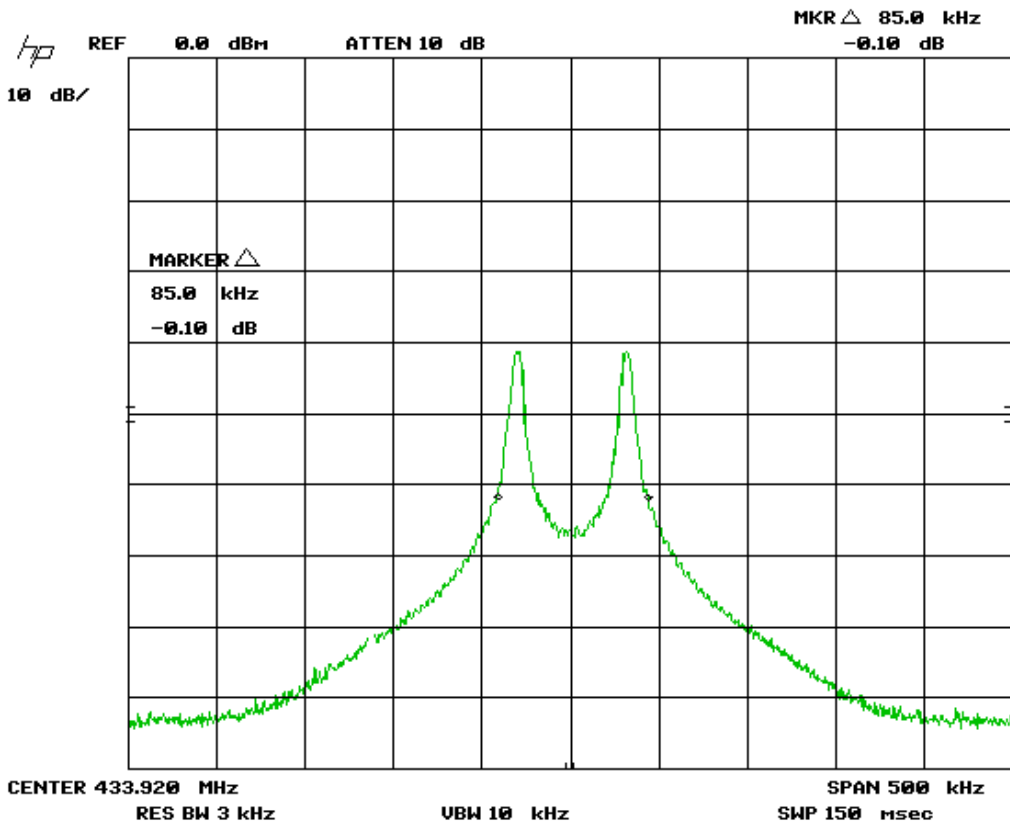
Results

The EUT passed. The 20 dB BW measured was 85.0 kHz and the requirement was that this be less than 1.08 MHz.


| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Graph(s)

The graphs shown below shows the channel spacing during the operation of the device. This is measured by a max hold on the spectrum analyzer and the highest resolution bandwidth that is approximately 1 % of the 20 dB BW during operation of the EUT. This measurement is a peak measurement. Max hold is performed for a duration of not less then 1 minute. Markers are set at 20 dB below peak.




Note: See ‘Appendix B – EUT & Test Setup Photographs’ for photos showing the test set-up.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Test Equipment List

| Equipment | Model No. | Manufacturer | Last calibration date | Next calibration due date | Asset # |
|------------------------|-------------------------|--------------|-----------------------|---------------------------|---------|
| Spectrum Analyzer | 8566B | HP | 1/22/13 | 1/22/15 | 4169 |
| Quasi Peak Adapter | 85650A | HP | 1/23/13 | 1/23/15 | 4170 |
| BiLog Antenna | 3142-C | ETS | 4/25/13 | 4/25/15 | 4002 |
| Attenuator 3 dB | FP-50-3 | Trilithic | N/A | N/A | 4028 |
| 9kHz-1GHz, 28dB preamp | LNA 6901 | Teseq | 8-6-13 | 8-6-15 | 4036 |
| RF Cable 7m | LMR-400-7M-50OHM-MN-MN | LexTec | NCR | NCR | 4026 |
| RF Cable 1M | LMR-400-1M-50OHM-MN-MN | LexTec | N/A | N/A | 4039 |
| RF Cable 10m | LMR-400-10M-50OHM-MN-MN | LexTec | NCR | NCR | 4025 |

This report module is based on GEMC template "FCC - 15.231 - 20dB Bandwidth_Rev1.doc"

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Radiated Emissions of Fundamental

Purpose

The purpose of this test is to ensure that the RF energy intentionally emitted from the EUT does not exceed the limit listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect other periodic operating devices, and licensed broadcasting devices, and so on, from unwanted interference.

Limit(s) and Method

The method is as defined in ANSI C63.4:2003.


The limits are as defined in FCC Part 15, Section 15.231 (b), and is specific for the one frequency for the fundamental transmit frequency.

433.92 MHz – 80.8 dBuV/m¹.

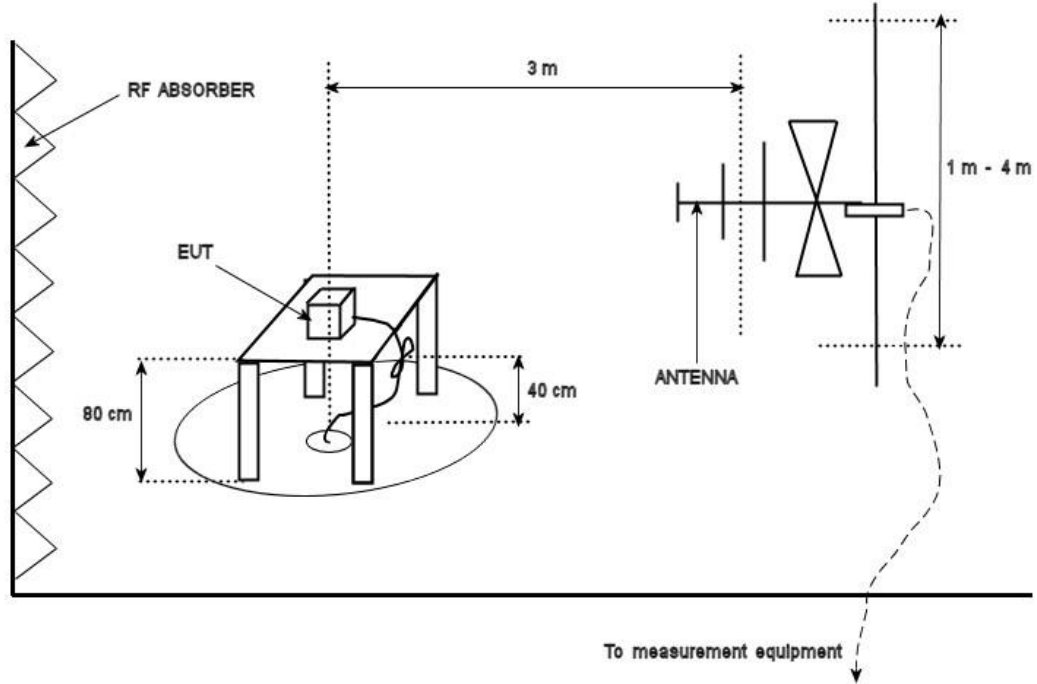
433.92 MHz – 100.8 dBuV/m²


¹Based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

²Based on peak detector measured emissions.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Typical Radiated Emissions Setup




| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Measurement Uncertainty

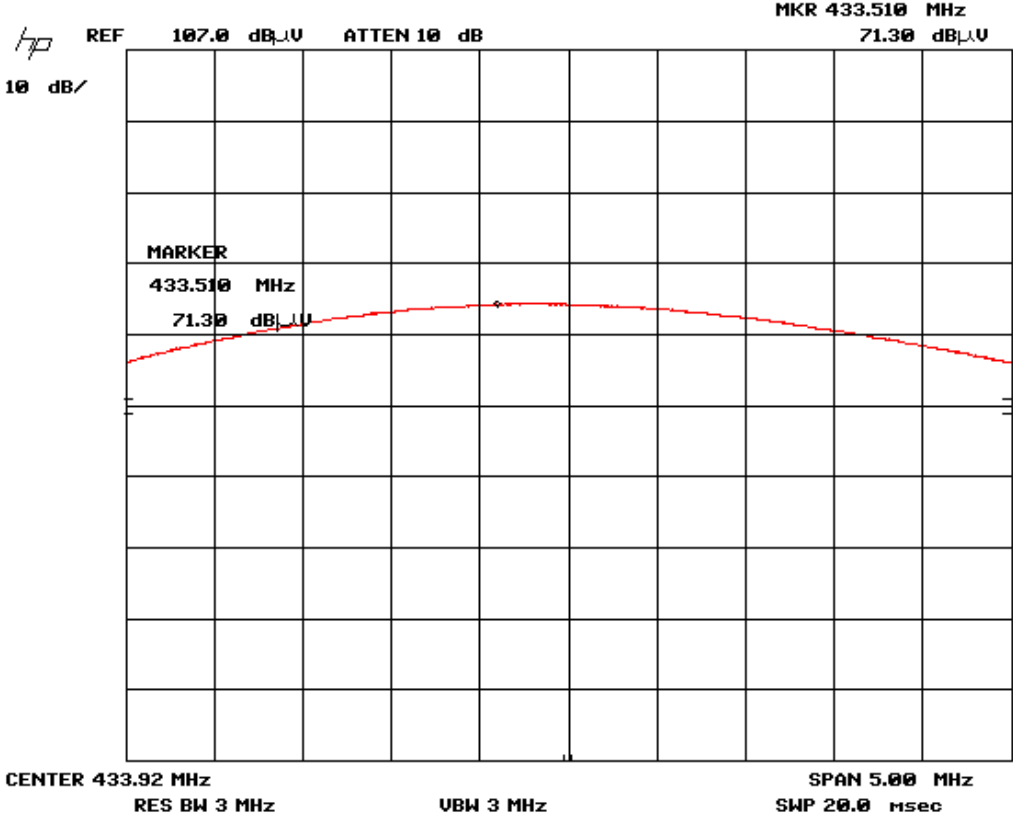
The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-4.4 dB with a 'k=2' coverage factor and a 95% confidence level.


Preliminary Graphs

Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured with a resolution bandwidth greater than the final required detector and over a full 0-360 rotation. This peaking process is done as a worst case measurement. This process enables the detection of frequencies of concern for final measurement, and provides considerable time savings. Final measurements are performed over a full 0-360 degrees rotation and 1 – 4 meter height of measurement antenna.

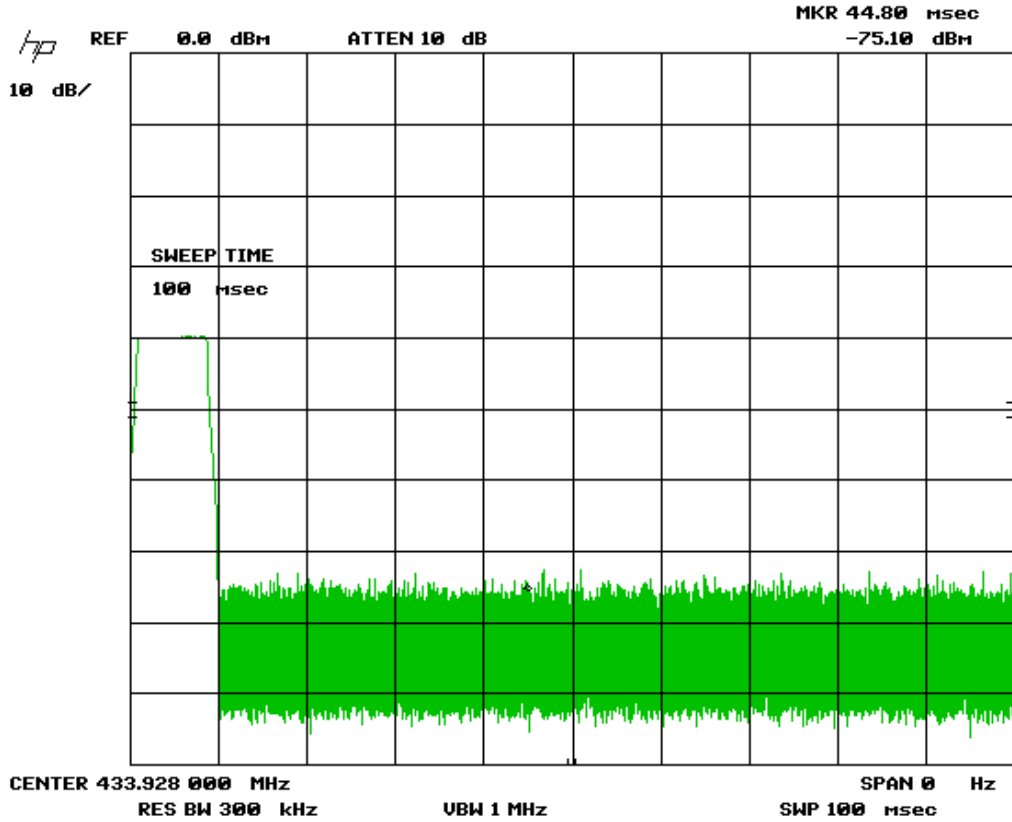
| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Screen capture of fundamental emission

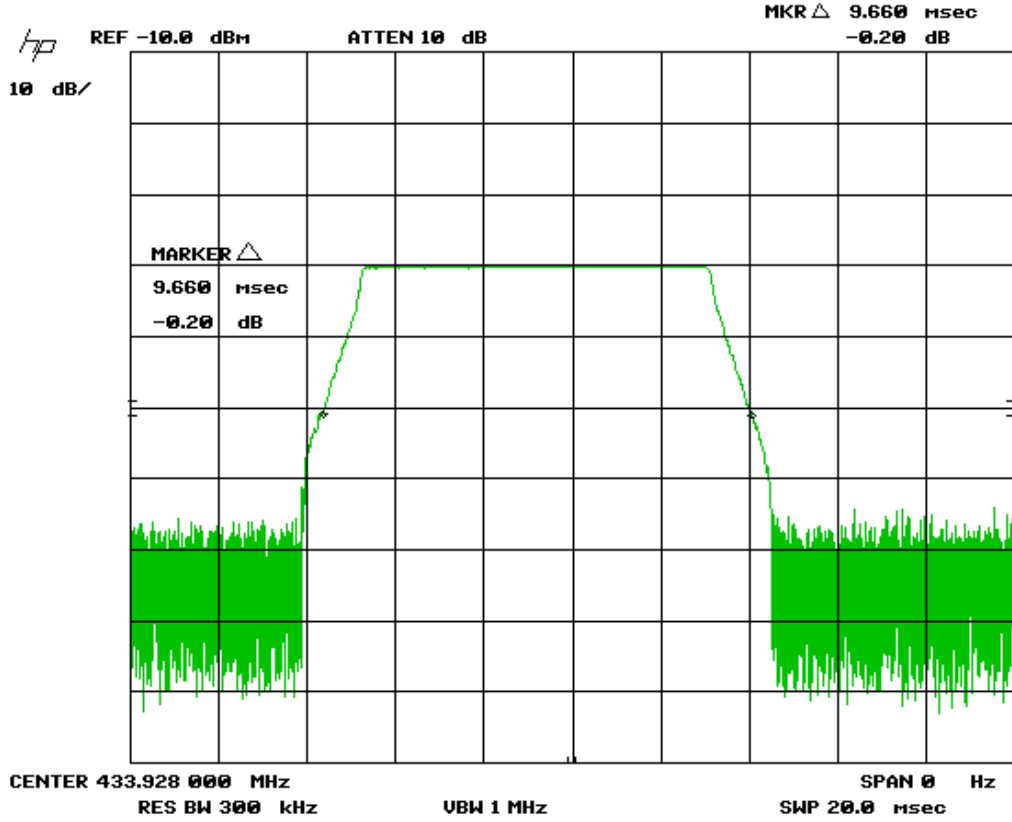



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Screen capture of pulse width –
duty cycle

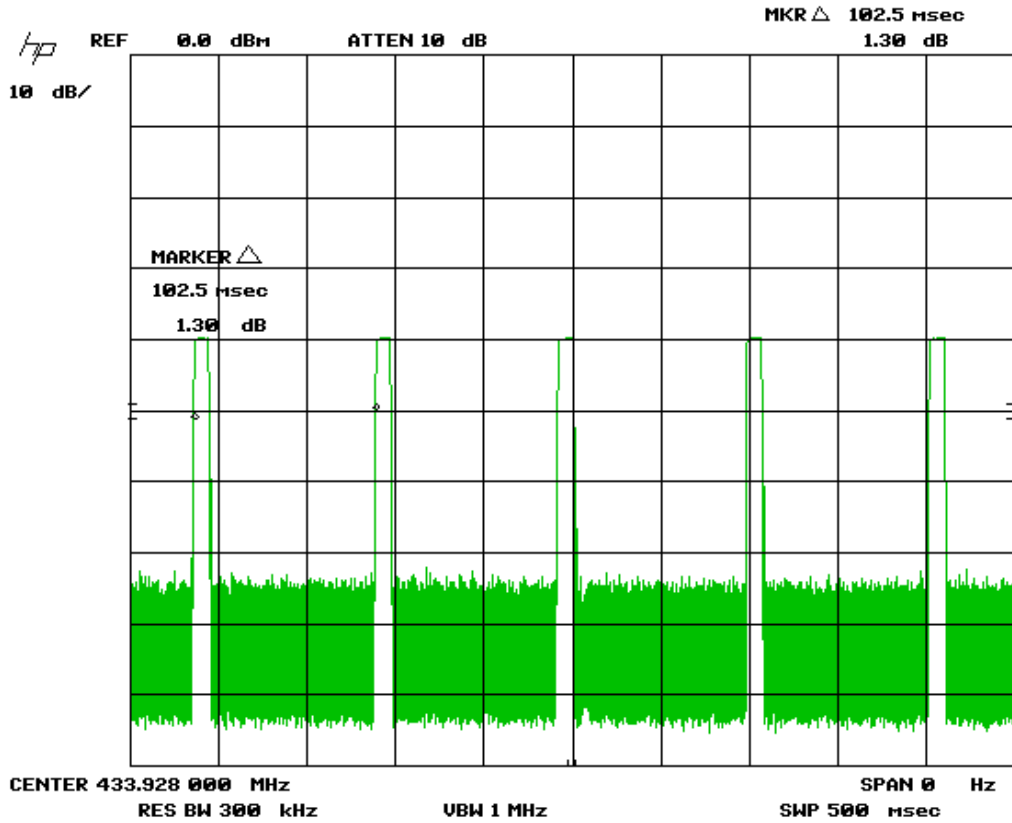



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Maximum repeat time.



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Final Measurements

The device complies with the requirement. A worst case measurement of 89.7 dBuV/m at 3 meters was obtained at a center frequency of 433.92 MHz in the vertical polarity. The worst case measurement as listed in the table below appeared at a vertical antenna height of 120 cm and a table azimuth of 240 degrees, as pictured in Appendix A.

| Test Freq. (MHz) | Detection mode | Antenna polarity (Horz/ Vert) | Raw signal dB(μ V) | Antenna factor dB | Cable loss dB | Atten. dB | Received signal dB(μ V/m) | Emission limit dB(μ V/m) | Margin dB(μ V) | Result |
|------------------|----------------|-------------------------------|-------------------------|-------------------|---------------|-----------|--------------------------------|-------------------------------|---------------------|--------|
| 433.92 | Peak | Horz | 64.2 | 17.1 | 0 | 1.9 | 83.2 | 100.8 | 17.6 | PASS |
| 433.92 | Avg | Horz | 43.9 | 17.1 | 0 | 1.9 | 62.9 | 80.8 | 17.9 | PASS |
| 433.92 | Peak | Vert | 71.3 | 16.5 | 0 | 1.9 | 89.7 | 100.8 | 11.1 | PASS |
| 433.92 | Avg | Vert | 51.0 | 16.5 | 0 | 1.9 | 69.4 | 80.8 | 11.4 | PASS |

The averaging factor was calculated from an ON time of 9.66ms per pulse using $20\log(9.66\text{ms}/100\text{ms}) = -20.3\text{dB}$. The Calculated Average is therefore $89.7-20.3=69.4\text{dBuV/m}$. The limit is 80.8dBuV/m .


This is passing with 11.1 dB of margin to the requirement.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Test Equipment List

| Equipment | Model No. | Manufacturer | Last calibration date | Next calibration due date | Asset # |
|------------------------|-------------------------|--------------|-----------------------|---------------------------|---------|
| Spectrum Analyzer | 8566B | HP | 1/22/13 | 1/22/15 | 4169 |
| Quasi Peak Adapter | 85650A | HP | 1/23/13 | 1/23/15 | 4170 |
| BiLog Antenna | 3142-C | ETS | 4/25/13 | 4/25/15 | 4002 |
| Attenuator 3 dB | FP-50-3 | Trilithic | N/A | N/A | 4028 |
| 9kHz-1GHz, 28dB preamp | LNA 6901 | Teseq | 8-6-13 | 8-6-15 | 4036 |
| RF Cable 7m | LMR-400-7M-50OHM-MN-MN | LexTec | NCR | NCR | 4026 |
| RF Cable 1M | LMR-400-1M-50OHM-MN-MN | LexTec | N/A | N/A | 4039 |
| RF Cable 10m | LMR-400-10M-50OHM-MN-MN | LexTec | NCR | NCR | 4025 |

This report module is based on GEMC template "FCC - 15.209 - Radiated Emissions_Rev5.doc"

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Unintentional Radiated Emissions and Spurious Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

Limit(s) and Method

The method is as defined in ANSI C63.4:2003.

The limits are as defined in FCC Part 15, Section 15.231 (b), and 15.209 (a) in the frequency ranges specified in 15.205 (a). The tables below show the values of these limits.


FCC 15.231 (b) Emission Limits:

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emissions (microvolts/meter) |
|-----------------------------|--|---|
| 40.66–40.70 | 2,250 | 225 |
| 70–130 | 1,250 | 125 |
| 130–174 | ¹ 1,250 to 3,750 | ¹ 125 to 375 |
| 174–260 | 3,750 | 375 |
| 260–470 | ¹ 3,750 to 12,500 | ¹ 375 to 1,250 |
| Above 470 | 12,500 | 1,250 |

¹Linear interpolations.

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

FCC 15.205 (a) Restricted Frequency Bands:

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

| MHz | MHz | MHz | GHz |
|--------------------------|---------------------|---------------|------------------|
| 0.090–0.110 | 16.42–16.423 | 399.9–410 | 4.5–5.15 |
| ¹ 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 | (²) |
| 13.36–13.41 | | | |


¹Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.

²Above 38.6

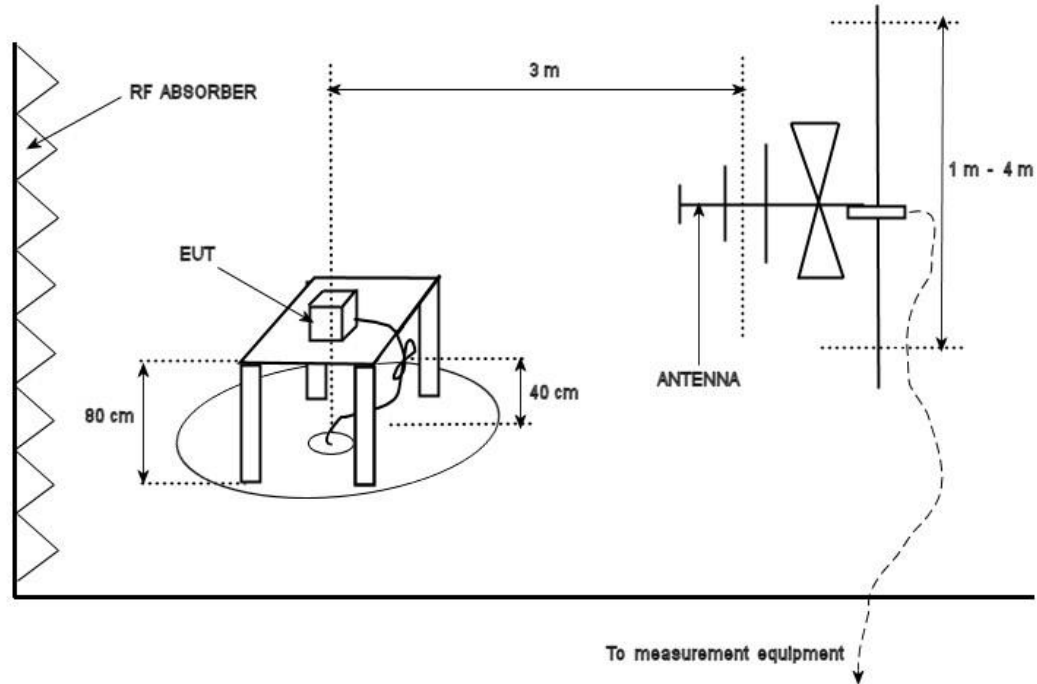
FCC 15.209 (a) Emission Limits

| 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 |

Note: A peak limit that is 20 dB higher than the limits specified above applies.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Typical Radiated Emissions Setup




Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-4.4 dB with a 'k=2' coverage factor and a 95% confidence level.

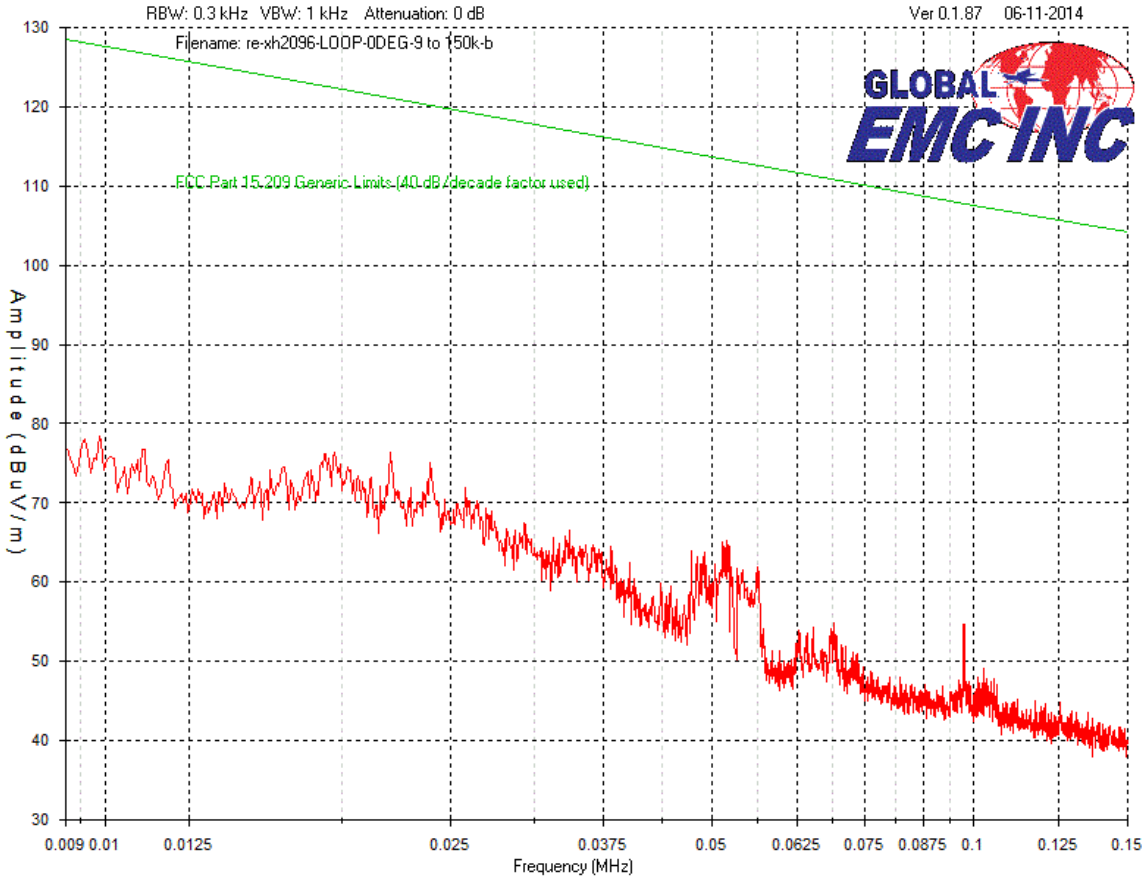
Preliminary Graphs


Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured with a resolution bandwidth greater than the final required detector and over a full 0-360 rotation. This peaking process is done as a worst case measurement. This process enables the detection of frequencies of concern for final measurement, and provides considerable time savings. Final measurements are performed over a full 0-360 degrees rotation and 1 – 4 meter height of measurement antenna.

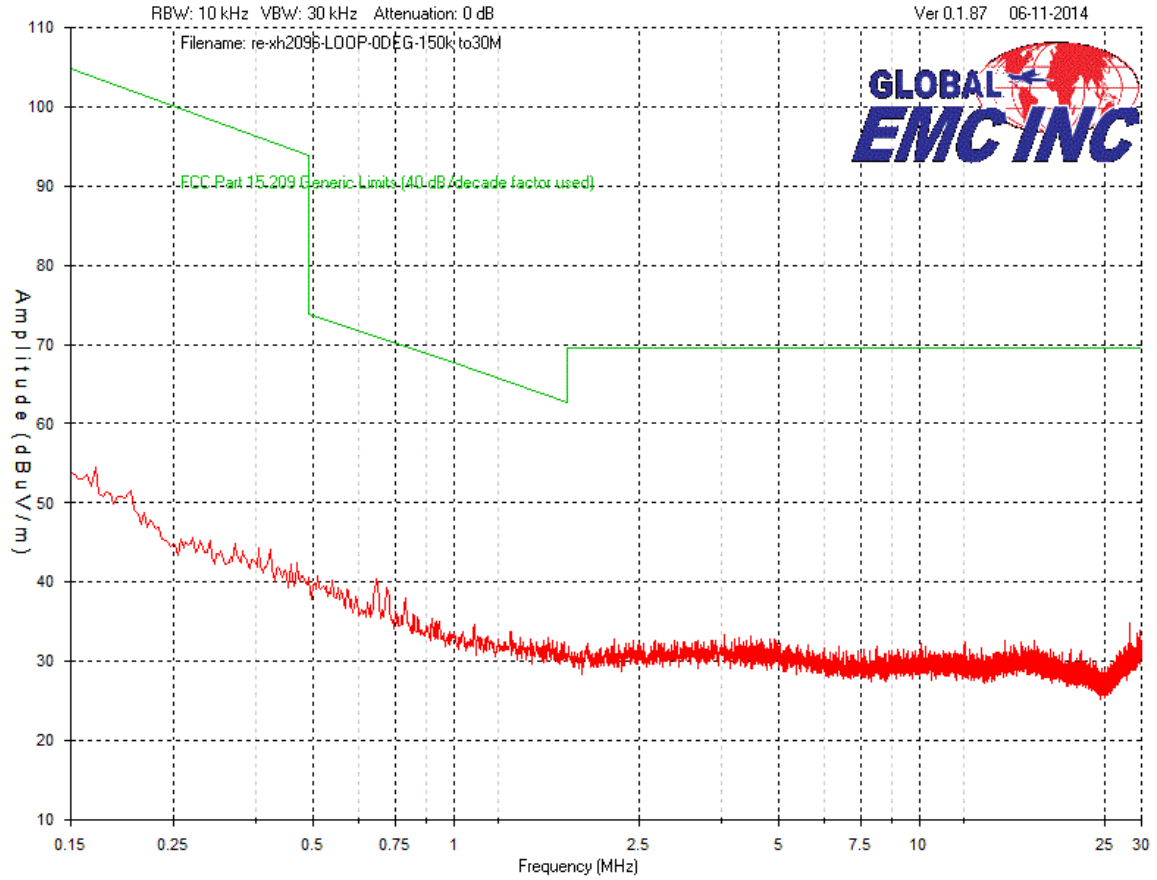
In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to a minimum of a 4.4 GHz.


| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Loop @ 0 degree – Peak Emissions Graph

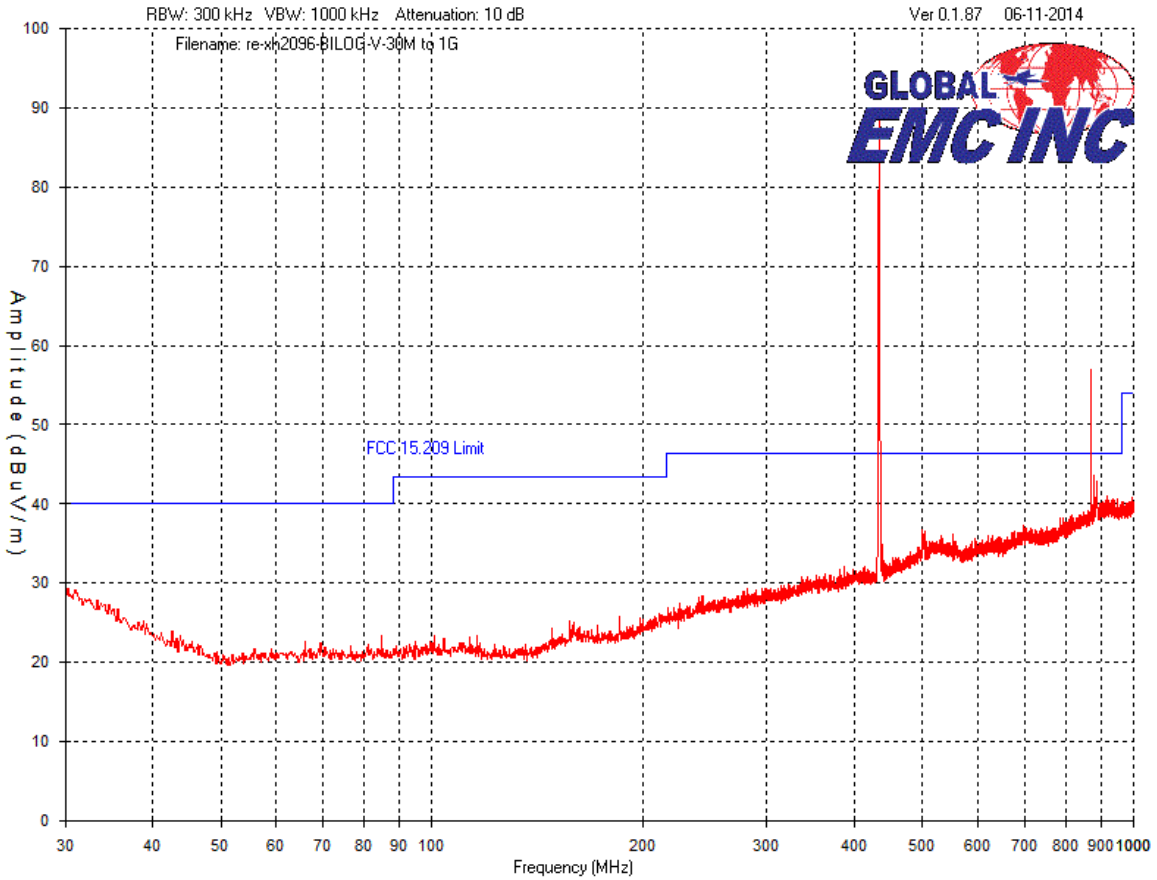



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

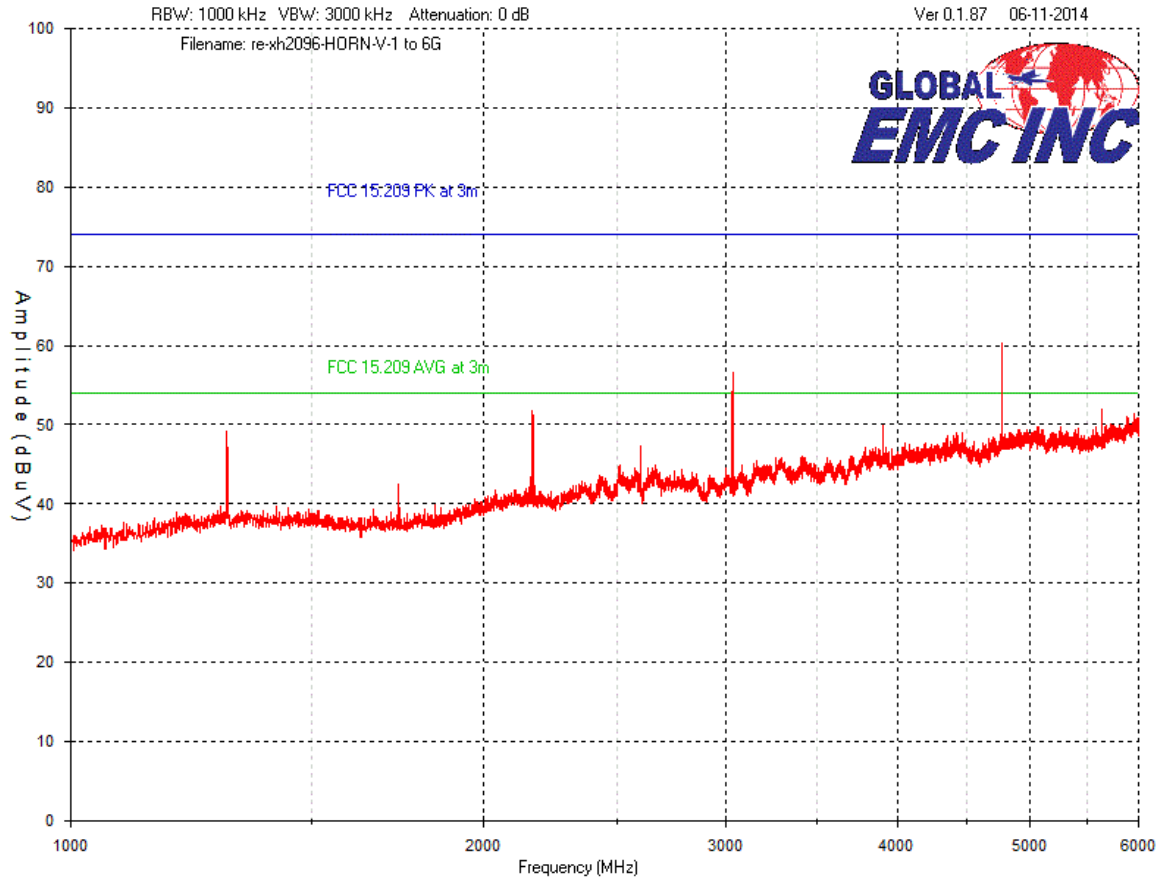



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Vertical – Peak Emissions Graph

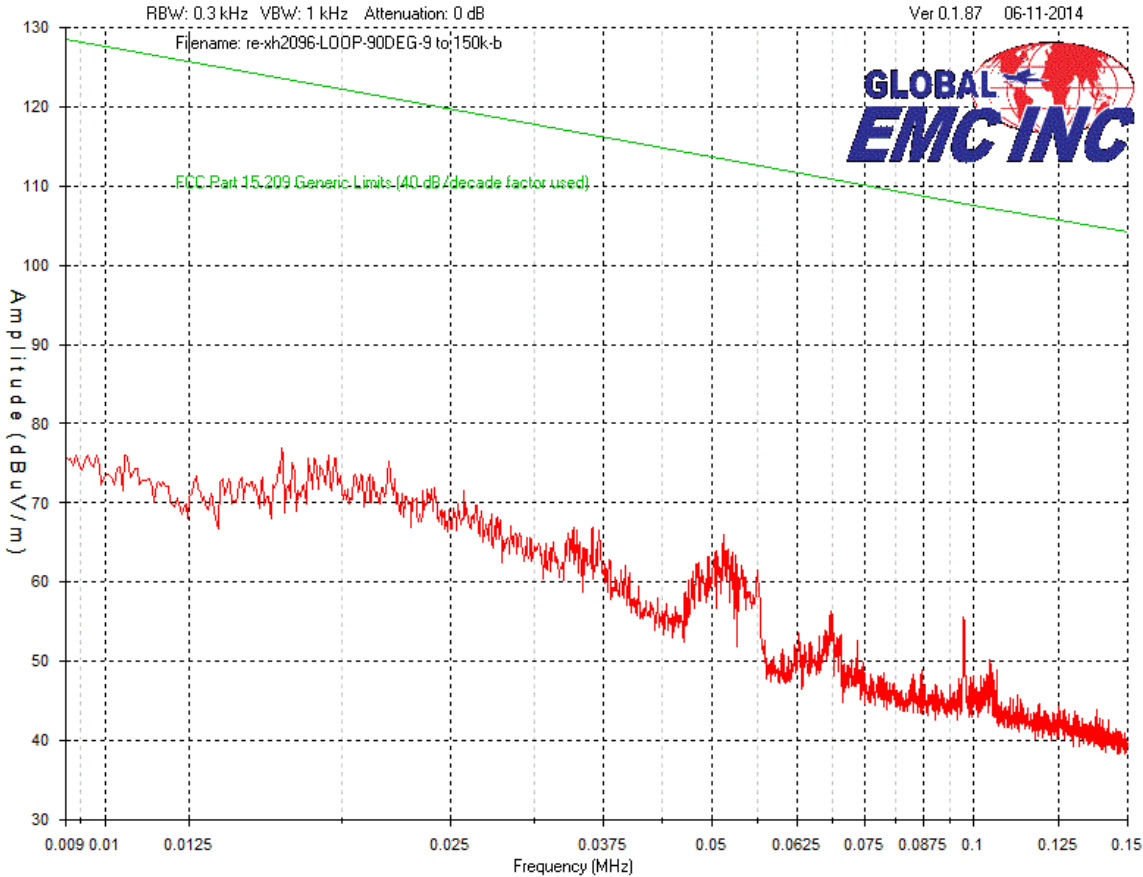


| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

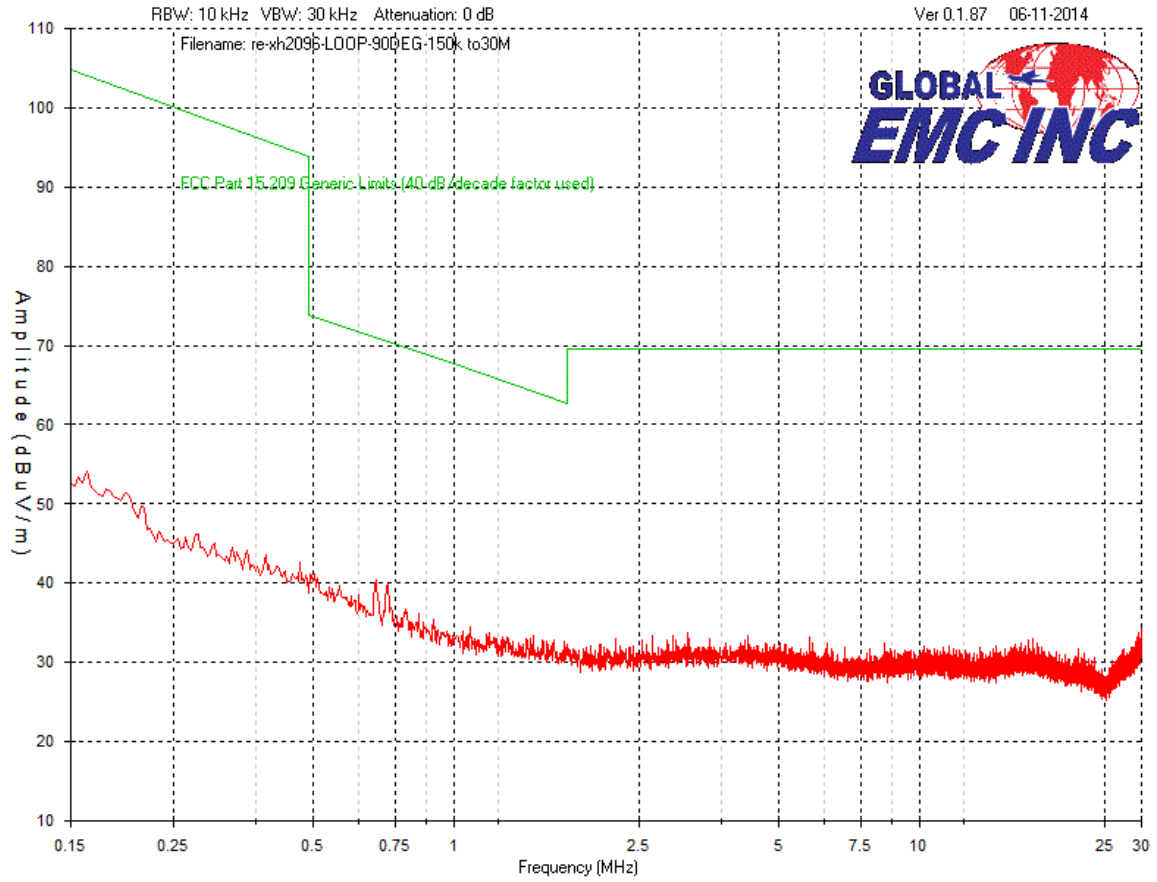



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Loop @ 90 degree – Peak Emissions Graph

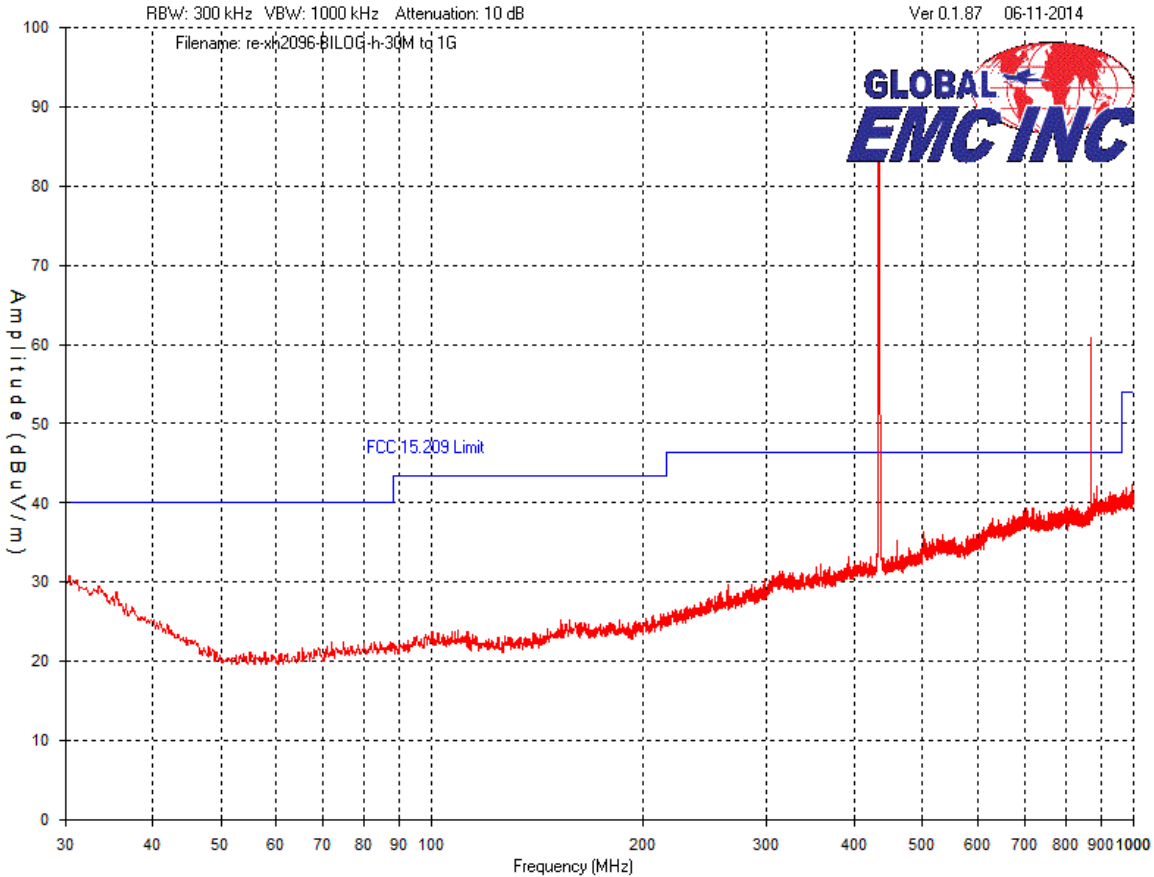



| | |
|-------------|---|
| Client | Fortin Auto Radio Inc. |
| Product | XH2296 |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 |

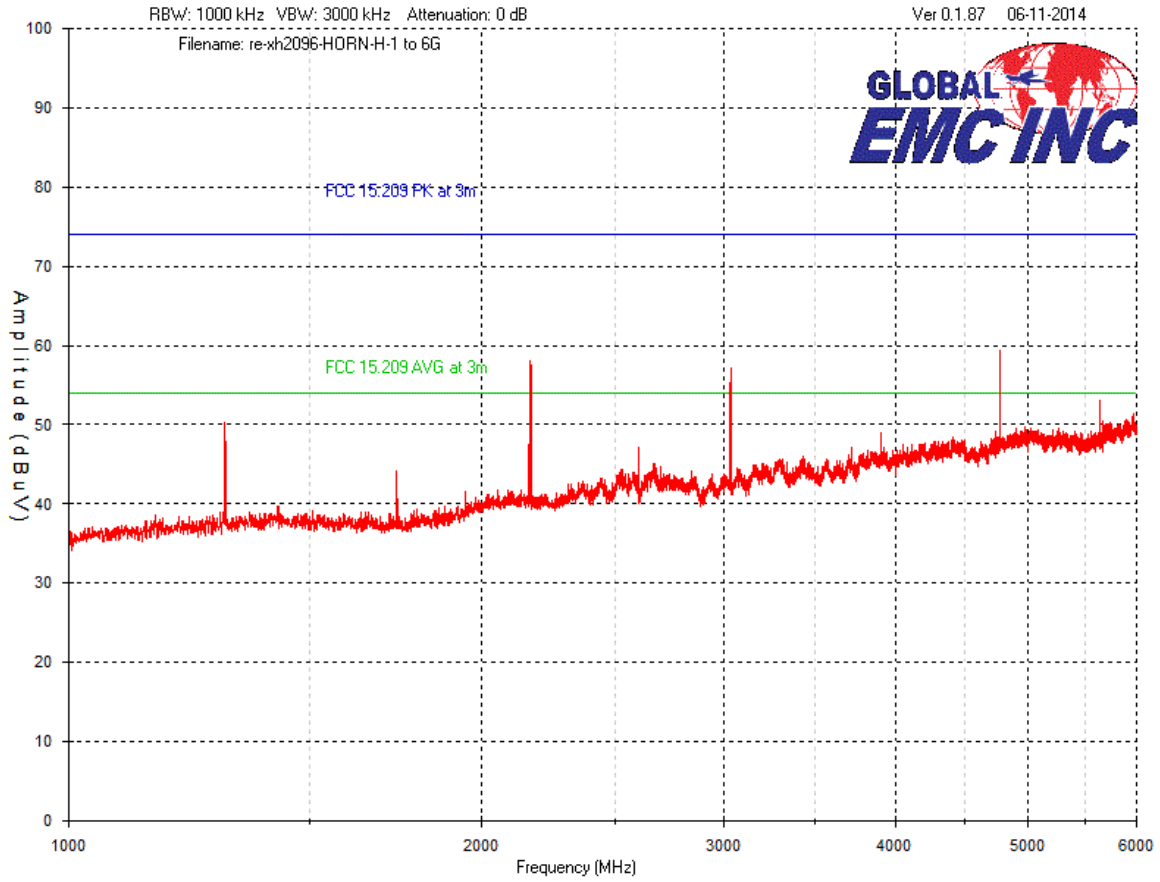



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Horizontal – Peak Emissions Graph



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |




| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Final Measurements

The device complies with the requirement. A worst case measurement of 60.3 dBuV/m at 3 meters was obtained at a frequency of 4773 MHz. The worst case measurement as listed in the table below appeared at a vertical antenna height of 120 cm and a table azimuth of 260 degrees, as pictured in Appendix A.

| Test Frequency (MHz) | Det. mode | Antenna polarity (Horz/Vert) | Raw signal dBµV | Ant. factor dB | Att. dB | Cable loss dB | Pre-Amp Gain dB | Received signal dB(µV/m) | Emission limit dB(µV/m) | Margin dBµV | Result |
|----------------------|-----------|------------------------------|-----------------|----------------|---------|---------------|-----------------|--------------------------|-------------------------|-------------|--------|
| 868 | Peak | Horz | 57.8 | 22.9 | 6 | 2.7 | -28.5 | 60.9 | 80.8 | 19.9 | PASS |
| 868 | Avg | Horz | 37.5 | 22.9 | 6 | 2.7 | -28.5 | 40.6 | 60.8 | 20.2 | PASS |
| 868 | Peak | Vert | 53.9 | 22.7 | 6 | 2.7 | -28.5 | 56.8 | 80.8 | 24.0 | PASS |
| 868 | Avg | Vert | 33.6 | 22.7 | 6 | 2.7 | -28.5 | 36.5 | 60.8 | 24.3 | PASS |
| 1302 | Peak | Horz | 55.6 | 25 | 0 | 3.4 | -33.7 | 50.3 | 74 | 23.7 | PASS |
| 1302 | Avg | Horz | 35.3 | 25 | 0 | 3.4 | -33.7 | 30 | 54 | 24.0 | PASS |
| 1302 | Peak | Vert | 53.8 | 25.6 | 0 | 3.4 | -33.7 | 49.1 | 74 | 24.9 | PASS |
| 1302 | Avg | Vert | 33.5 | 25.6 | 0 | 3.4 | -33.7 | 28.8 | 54 | 25.2 | PASS |
| 2170 | Peak | Horz | 59.3 | 27.2 | 0 | 4.6 | -33.1 | 58 | 80.8 | 22.8 | PASS |
| 2170 | Avg | Horz | 39.0 | 27.2 | 0 | 4.6 | -33.1 | 37.7 | 60.8 | 23.1 | PASS |
| 2170 | Peak | Vert | 53.1 | 27.1 | 0 | 4.6 | -33.1 | 51.7 | 80.8 | 29.1 | PASS |
| 2170 | Avg | Vert | 32.8 | 27.1 | 0 | 4.6 | -33.1 | 31.4 | 60.8 | 29.4 | PASS |
| 2604 | Peak | Horz | 45.7 | 29.3 | 0 | 5.2 | -33.1 | 47.1 | 80.8 | 33.7 | PASS |
| 2604 | Avg | Horz | 25.4 | 29.3 | 0 | 5.2 | -33.1 | 26.8 | 60.8 | 34.0 | PASS |
| 2604 | Peak | Vert | 45.8 | 29.3 | 0 | 5.2 | -33.1 | 47.2 | 80.8 | 33.6 | PASS |
| 2604 | Avg | Vert | 25.5 | 29.3 | 0 | 5.2 | -33.1 | 26.9 | 60.8 | 33.9 | PASS |
| 3037 | Peak | Horz | 54.7 | 30.1 | 0 | 5.6 | -33.1 | 57.3 | 80.8 | 23.5 | PASS |
| 3037 | Avg | Horz | 34.4 | 30.1 | 0 | 5.6 | -33.1 | 37 | 60.8 | 23.8 | PASS |
| 3037 | Peak | Vert | 54.2 | 30 | 0 | 5.6 | -33.1 | 56.7 | 80.8 | 24.1 | PASS |
| 3037 | Avg | Vert | 33.9 | 30 | 0 | 5.6 | -33.1 | 36.4 | 60.8 | 24.4 | PASS |
| 4773 | Peak | Horz | 52.2 | 33.1 | 0 | 6.9 | -32.8 | 59.4 | 74 | 14.6 | PASS |
| 4773 | Avg | Horz | 31.9 | 33.1 | 0 | 6.9 | -32.8 | 39.1 | 54 | 14.9 | PASS |
| 4773 | Peak | Vert | 53.1 | 33.1 | 0 | 6.9 | -32.8 | 60.3 | 74 | 13.7 | PASS |
| 4773 | Avg | Vert | 32.8 | 33.1 | 0 | 6.9 | -32.8 | 40 | 54 | 14.0 | PASS |


Note: Average measurements are shown by applying a duty cycle correction factor, as reported previously in this test report, to the peak data.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Test Equipment List

| Equipment | Model No. | Manufacturer | Last calibration date | Next calibration due date | Asset # |
|------------------------|-------------------------|-----------------|-----------------------|---------------------------|---------|
| Spectrum Analyzer | 8566B | HP | 1/22/13 | 1/22/15 | 4169 |
| Quasi Peak Adapter | 85650A | HP | 1/23/13 | 1/23/15 | 4170 |
| Loop Antenna | EM 6879 | Electro-Metrics | 10-11-13 | 10-11-15 | 4040 |
| BiLog Antenna | 3142-C | ETS | 4/25/13 | 4/25/15 | 4002 |
| Attenuator 3 dB | FP-50-3 | Trilithic | N/A | N/A | 4028 |
| 9kHz-1GHz, 28dB preamp | LNA 6901 | Teseq | 8-6-13 | 8-6-15 | 4036 |
| Horn Antenna | ATH1G18G | AR | 4/3/13 | 4/3/15 | 4003 |
| 1GHz-26.5GHz preamp | HP 8449B | HP | 4/25/13 | 4/25/15 | 4006 |
| RF Cable 7m | LMR-400-7M-50OHM-MN-MN | LexTec | NCR | NCR | 4026 |
| RF Cable 1M | LMR-400-1M-50OHM-MN-MN | LexTec | N/A | N/A | 4039 |
| RF Cable 10m | LMR-400-10M-50OHM-MN-MN | LexTec | NCR | NCR | 4025 |

This report module is based on GEMC template "FCC - 15.209 - Radiated Emissions_Rev5.doc"


| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Appendix A – EUT Summary


For further details for filing purposes, refer to filing package.

General EUT Description

| Client Details | |
|--|--|
| Organization / Address | Fortin Auto Radio Inc. 5540 Metropolitan E. Montreal, Qc, H1S 1A6 Canada |
| Contact | Martin Tessier |
| Phone | 514-255-2720 ext 231 |
| Email | Martin.tessier@fortinradio.ca |
| EUT (Equipment Under Test) Details | |
| EUT Name (for report title) | XH2296 |
| EUT revision | New Product |
| Software version | 1.0 |
| EUT is powered using | 2 x CR2032 battery |
| Input voltage range(s) (V) | 6 Volts |
| Frequency range(s) (Hz) | 433.92Mhz |
| Rated input current (A) | 32 mA |
| Number of power supplies in EUT | 0 |
| Transmits RF energy? (describe) | 10dB |
| Basic EUT functionality description | When button is press by user, the remote transmit data then stop when button is release. |
| Customer to setup EUT on site? | yes |
| EUT response time (ms) | NA |
| EUT setup time (min) | 1 |
| Frequency of all clocks present in EUT | 26 Mhz |
| Dimensions of product | L 50mm W 25mm H 7mm |


| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see ‘Appendix B – EUT & Test Setup Photographs’.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Appendix B – EUT and Test Setup Photographs

Note: These photos are for information purposes only. Also refer to PDF files that are separate from this test report.

| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


EUT's Photo



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |


Radiated Emission Test Setup Photo #1:



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Radiated Emission Test Setup Photo #2:



| | | |
|-------------|---|---|
| Client | Fortin Auto Radio Inc. |  |
| Product | XH2296 | |
| Standard(s) | RSS 210 Issue 8/ FCC Part 15 Subpart C 15 | |

Radiated Emission Test Setup Photo #3:

