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# TEST REPORT

**Report Number:** **102921149LEX-002**
**Project Number:** **G102921149**

**Report Issue Date:** **3/8/2017**

**Product Name:** **GPS-610**

**FCC Standards:** **FCC Part 22H and 24E**
**ISED Standards:** **RSS-132 Issue 3, Rss-133 Issue 6**

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510

Client:
Alcohol Monitoring Systems
1035 Windward Ridge Pkwy Ste 575
Alpharetta, GA 30005-1788

Report prepared by

Brian Lackey, Project Engineer

Report reviewed by

Bryan Taylor, Team Leader

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## 1 Introduction and Conclusion

The tests indicated in section 2 were performed on the product constructed as described in section 3. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test method, a list of the actual test equipment used, documentation photos, results and raw data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complied with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under registration number 485103. The test site is listed with Industry Canada under site number IC 2042M-1.

## 2 Test Summary

| Page | Test full name | FCC Reference | ISED Reference | Result |
|---|---|---|---|---|
| 6 | Conducted Output Power | §2.1046<br>§24.232(d) | RSS-132 (5.4),<br>RSS-133 (6.1) | Pass |
| --- | Occupied Bandwidth | §2.1049,<br>§22.917(b)(d), and<br>§24.238(a) | RSS-Gen (4.6.1) | Note[1] |
| --- | Conducted Spurious Emissions / Band Edge | §2.1049, §2.1051,<br>§22.917(a)(b), and<br>§ 24.238(a)(b) | RSS-132 (5.5),<br>RSS-133 (6.5.1) | Note[1] |
| --- | Radiated Output Power | § 22.913(a) and<br>§ 24.232(c) | RSS-132 (5.4),<br>RSS-133 (6.4) | Note[1] |
| 7 | Radiated Spurious Emissions (Transmitter) | §2.1053, §22.917(a)(b),<br>and §24.238(a)(b) | RSS-132 (5.5),<br>RSS-133 (6.5.1) | Pass |
| --- | Frequency Stability | §2.1055, §22.355, and<br>§24.235 | RSS-132 (5.3),<br>RSS-133 (6.3) | Note[1] |

1 See Module FCC report (FCCID RI7DE910-DUAL)

## 3 Description of Equipment Under Test

| Equipment Under Test | |
|---|---|
| **Manufacturer** | Alcohol Monitoring Systems |
| **Model Number** | GPS-610 |
| **Serial Number** | Test Sample 1 |
| **Receive Date** | 3/6/2017 |
| **Test Start Date** | 3/6/2017 |
| **Test End Date** | 3/8/2017 |
| **Device Received Condition** | Good |
| **Test Sample Type** | Production |
| **Frequency Band** | 824MHz - 849MHz (CDMA Cell Band)<br>1850MHz – 1910MHz (CDMA PCS Band) |
| **Modulation Type** | CDMA |
| **Transmission Control** | Base Station Simulator |
| **Maximum Output Power (Conducted)** | 24.72dBm (Cell Band)<br>24.33dBm (PCS Band) |
| **Test Channels** | 1013, 384, and 777 (CDMA Cell Band)<br>25, 600, and 1075 (CDMA PCS Band) |
| **Antenna Type** | Internal |
| **Operating Voltage** | 5VDC |

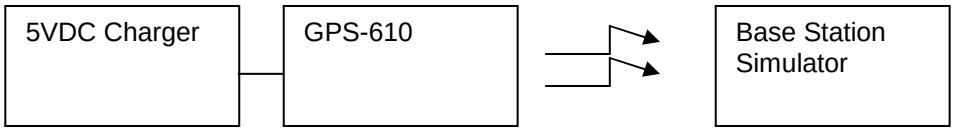
| **Description of Equipment Under Test** |
|---|
| The GPS-610 is a body worn one-piece GPS tracking bracelet that combines superior location accuracy with industry-leading battery life and tamper detection. It integrates the Telit DE910-DUAL module (FCCID: RI7DE910-DUAL) for communication with the cellular network. |

**Operating modes of the EUT:**

| No. | **Descriptions of EUT Exercising** |
|---|---|
| 1 | Transmitting a CDMA signal |
| 2 | Receive / idle mode |

### 3.1 System setup including cable interconnection details, support equipment and simplified block diagram

### 3.2 EUT Block Diagram:




### 3.3 Cables:

| Cables | | | | | |
|---|---|---|---|---|---|
| Description | Length | Shielding | Ferrites | Connection | |
| | | | | From | To |
| Charging Cable | 5ft | None | None | 5VDC Charger | Test sample |

### 3.4 Support Equipment:

No support equipment was used during the evaluation. The GPS-610 was tested in a stand alone configuration.

# 4 Conducted Output Power

## 4.1 Test Limits

**§ 2.1046**

For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8).

**§ 24.232 (d)**

Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

## 4.2 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed into a call and the transmitter output was read off the base station simulator in dBm. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the base station simulator power reading. Tests were performed at three frequencies (low, middle, and high channels) and on the highest power levels, which can be setup on the transmitters.

## 4.3 Test Equipment Used:

| Description | Serial Number | Manufacturer | Model | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Base Station Simulator | 3956 | Rohde&Schwarz | CMU200 | 9/25/2016 | 9/25/2017 |

## 4.4 Results:

**Average Conducted Output Power**

| CDMA Cell Band | | | CDMA PCS Band | | |
|---|---|---|---|---|---|
| Channel 1013 | Channel 384 | Channel 777 | Channel 25 | Channel 600 | Channel 1175 |
| 24.72 | 24.50 | 24.53 | 24.32 | 24.07 | 23.65 |

# 5 Radiated Spurious Emissions (Transmitter)

## 5.1 Test Limits

**§ 2.1053**

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

**§ 22.917**

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

**§ 24.238**

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

## 5.2 Test Procedure

The EUT was placed on a non-conductive turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. The EUT was forced to transmit at its maximum output power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic was investigated in order to identify the spurious emission. Once the spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-C. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

## 5.3 Test Equipment Used:

| Description | Serial Number | Manufacturer | Model | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| EMI Test Receiver | 1302.6005.40 | Rohde & Schwarz | ESU40 | 9/26/2016 | 9/26/2017 |
| Preamplifier | 122005 | Rohde&Schwarz | TS-PR18 | 11/17/2016 | 11/17/2017 |
| Preamplifier | 100050 | Rohde&Schwarz | TS-PR26 | 11/17/2016 | 11/17/2017 |
| Bilog Antenna | 00051864 | ETS | 3142C | 3/24/2016 | 3/24/2017 |
| Biconnical Antenna | 3958 | ETS | 3180B | 3/8/2016 | 3/8/2017 |
| Horn Antenna | 00156319 | ETS | 3117 | 6/3/2016 | 6/3/2017 |
| Horn Antenna | 00154521 | ETS | 3117 | 11/14/2016 | 11/14/2017 |
| High Pass Filter | 1 | Wainwright | WHKX12-2533.85-2710-1800-40SS | 11/17/2016 | 11/17/2017 |
| High Pass Filter | 1 | Wainwright | WHKX12-1028.5-1100-1500-40SS | 11/17/2016 | 11/17/2017 |
| Base Station Simulator | 3956 | Rohde&Schwarz | CMU200 | 9/25/2016 | 9/25/2017 |

## 5.4 Results:

All radiated spurious emissions were attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB which is equivalent to -13dBm.

**Worst Case Spurious Measurements Cell Band**

| Radiated Spurious Emissions Measurement | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Test Engineer:** | Bryan Taylor | | **Start Date:** | 3/7/2017 | | **End Date:** | 3/7/2017 | |
| **Temperature:** | 23.7c | | **Humidity:** | 47.50% | | **Pressure:** | 988.7mBar | |
| **RBW:** | 1MHz | | **VBW:** | 3MHz | | | | |
| **Notes:** | Results represent the worst case from 3 orthogonal axis positions. | | | | | | | |
| | | | **A** | **B** | **C** | **D** | **E** | **F** |
| **Band/Channel** | **Spurious Frequency (MHz)** | **Polarity** | **Device Reading (dBm)** | **Signal Generator Level (dBm)** | **Cable Loss (dB)** | **Tx Antenna Gain (dBd)** | **Limit (dBm)** | **Radiated Spurious Emission Level (dBm)** |
| CDMA Cell Band Low Channel (1013) | 1649.4 | H | -46.31 | -37.89 | 3.26 | 6.14 | -13 | -35.01 |
| | 1649.4 | V | -49.54 | -42.4 | 3.26 | 6.14 | -13 | -39.52 |
| | 2474.1 | H | -65.28 | -46.8 | 4.17 | 5.66 | -13 | -45.31 |
| | 2474.1 | V | -65.11 | -42.32 | 4.17 | 5.66 | -13 | -40.83 |
| | 3298.8 | H | -66.71 | -55.17 | 4.58 | 7.44 | -13 | -52.31 |
| | 3298.8 | V | -68.37 | -54.9 | 4.58 | 7.44 | -13 | -52.04 |
| | 4123.5 | H | -64.92 | -52.29 | 5.33 | 8.81 | -13 | -48.81 |
| | 4123.5 | V | -66.41 | -54.57 | 5.33 | 8.81 | -13 | -51.09 |
| | 4948.2 | H | -65.33 | -51.77 | 5.82 | 9.86 | -13 | -47.74 |
| | 4948.2 | V | -67.85 | -55.38 | 5.82 | 9.86 | -13 | -51.35 |
| CDMA Cell Band Mid Channel (384) | 1673.04 | H | -47.61 | -40.16 | 3.30 | 6.11 | -13 | -37.35 |
| | 1673.04 | V | -50.8 | -43.82 | 3.30 | 6.11 | -13 | -41.01 |
| | 2509.56 | H | -66.78 | -45.83 | 3.97 | 5.68 | -13 | -44.12 |
| | 2509.56 | V | -64.31 | -40.87 | 3.97 | 5.68 | -13 | -39.16 |
| | 3346.08 | H | -66.4 | -55.96 | 4.63 | 7.56 | -13 | -53.03 |
| | 3346.08 | V | -67.73 | -56.52 | 4.63 | 7.56 | -13 | -53.59 |
| | 4182.6 | H | -65.6 | -52.29 | 5.19 | 8.97 | -13 | -48.51 |
| | 4182.6 | V | -65.86 | -49.65 | 5.19 | 8.97 | -13 | -45.87 |
| | 5019.12 | H | -65.82 | -49.18 | 6.19 | 10.00 | -13 | -45.37 |
| | 5019.12 | V | -66.69 | -53.59 | 6.19 | 10.00 | -13 | -49.78 |
| CDMA Cell Band High Channel (777) | 1696.62 | H | -46.52 | -38.37 | 3.48 | 6.11 | -13 | -35.74 |
| | 1696.62 | V | -48.72 | -41.56 | 3.48 | 6.11 | -13 | -38.93 |
| | 2544.93 | H | -64.39 | -45.67 | 4.09 | 5.68 | -13 | -44.08 |
| | 2544.93 | V | -63.41 | -42.13 | 4.09 | 5.68 | -13 | -40.54 |
| | 3393.24 | H | -65.48 | -51.89 | 4.84 | 7.74 | -13 | -48.99 |
| | 3393.24 | V | -66.46 | -54 | 4.84 | 7.74 | -13 | -51.10 |
| | 4241.55 | H | -61.27 | -48.73 | 5.00 | 9.12 | -13 | -44.61 |
| | 4241.55 | V | -62.58 | -46.9 | 5.00 | 9.12 | -13 | -42.78 |
| | 5089.86 | H | -66.43 | -50.16 | 6.25 | 10.08 | -13 | -46.33 |
| | 5089.86 | V | -67.91 | -52.14 | 6.25 | 10.08 | -13 | -48.31 |
| | | | | | | | | F=B-C+D |

## Worst Case Spurious Measurements PCS Band

| Radiated Spurious Emissions Measurement | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Test Engineer:** | Bryan Taylor | | **Start Date:** | 3/7/2017 | | **End Date:** | 3/7/2017 | |
| **Temperature:** | 23.7c | | **Humidity:** | 47.50% | | **Pressure:** | 988.7mBar | |
| **RBW:** | 1MHz | | **VBW:** | 3MHz | | | | |
| **Notes:** | Results represent the worst case from 3 orthogonal axis positions. | | | | | | | |
| | | | **A** | **B** | **C** | **D** | **E** | **F** |
| **Band/Channel** | **Spurious Frequency (MHz)** | **Polarity** | **Device Reading (dBm)** | **Signal Generator Level (dBm)** | **Cable Loss (dB)** | **Tx Antenna Gain (dBd)** | **Limit (dBm)** | **Radiated Spurious Emission Level (dBm)** |
| CDMA PCS Band Low Channel (25) | 3702.5 | H | -57.42 | -40.61 | 4.85 | 8.14 | -13 | -37.32 |
| | 3702.5 | V | -58.64 | -45.17 | 4.85 | 8.14 | -13 | -41.88 |
| | 5553.75 | H | -61.68 | -44.01 | 6.91 | 10.50 | -13 | -40.42 |
| | 5553.75 | V | -64.22 | -47.66 | 6.91 | 10.50 | -13 | -44.07 |
| | 7405 | H | -54.67 | -36.8 | 7.75 | 11.85 | -13 | -32.70 |
| | 7405 | V | -64.23 | -44.67 | 7.75 | 11.85 | -13 | -40.57 |
| | 9256.25 | H | -63.11 | -43 | 9.21 | 13.16 | -13 | -39.05 |
| | 9256.25 | V | -65.89 | -45.02 | 9.21 | 13.16 | -13 | -41.07 |
| | 11107.5 | H | -67.64 | -46.09 | 10.47 | 13.08 | -13 | -43.48 |
| | 11107.5 | V | -65.34 | -40.48 | 10.47 | 13.08 | -13 | -37.87 |
| CDMA PCS Band Mid Channel (600) | 3760 | H | -58.71 | -43.77 | 5.20 | 8.16 | -13 | -40.82 |
| | 3760 | V | -61.36 | -48.63 | 5.20 | 8.16 | -13 | -45.68 |
| | 5640 | H | -62.16 | -44.71 | 7.09 | 10.52 | -13 | -41.29 |
| | 5640 | V | -65.55 | -49.67 | 7.09 | 10.52 | -13 | -46.25 |
| | 7520 | H | -59.57 | -41.15 | 8.01 | 11.98 | -13 | -37.18 |
| | 7520 | V | -65.91 | -46.1 | 8.01 | 11.98 | -13 | -42.13 |
| | 9400 | H | -65.18 | -45.56 | 9.15 | 13.20 | -13 | -41.51 |
| | 9400 | V | -66.31 | -47.16 | 9.15 | 13.20 | -13 | -43.11 |
| | 11280 | H | -66.69 | -43.71 | 10.16 | 13.08 | -13 | -40.79 |
| | 11280 | V | -66.46 | -42.75 | 10.16 | 13.08 | -13 | -39.83 |
| CDMA PCS Band High Channel (1175) | 3817.5 | H | -56.82 | -39.19 | 5.00 | 8.21 | -13 | -35.98 |
| | 3817.5 | V | -57.68 | -42.79 | 5.00 | 8.21 | -13 | -39.58 |
| | 5726.25 | H | -60.26 | -41.79 | 7.06 | 10.61 | -13 | -38.24 |
| | 5726.25 | V | -63.13 | -47.52 | 7.06 | 10.61 | -13 | -43.97 |
| | 7635 | H | -58.67 | -39.89 | 8.15 | 11.95 | -13 | -36.10 |
| | 7635 | V | -65.47 | -44.85 | 8.15 | 11.95 | -13 | -41.06 |
| | 9543.75 | H | -62.97 | -41.45 | 8.41 | 13.16 | -13 | -36.70 |
| | 9543.75 | V | -66.53 | -44.84 | 8.41 | 13.16 | -13 | -40.09 |
| | 11452.5 | H | -64.91 | -42.24 | 9.51 | 13.08 | -13 | -38.67 |
| | 11452.5 | V | -63.71 | -41.15 | 9.51 | 13.08 | -13 | -37.58 |
| | | | | | | | | F=B-C+D |

## 6 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

| Parameter | Uncertainty | Notes |
|---|---|---|
| Radiated emissions, 30 to 1000 MHz | ±3.9dB | |
| Radiated emissions, 1 to 18 GHz | ±4.2dB | |
| Radiated emissions, 18 to 40 GHz | ±4.3dB | |
| Power Port Conducted emissions, 150kHz to 30 MHz | ±2.8dB | |

## 7 Revision History

| Revision Level | Date | Report Number | Notes |
|---|---|---|---|
| 0 | 3/8/2017 | 102921149LEX-002 | Original Issue |
| | | | |
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