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# Certification Test Report

**FCC ID: UGL633ANH**
**IC: 7888B-633ANH**

**FCC Rule Part: 15.407**
**IC Radio Standards Specification: RSS-210**

**ACS Report Number: 11-2044.W04.22.A**

Manufacturer: DRS Tactical Systems, Inc.
Model: 633ANHMW

Test Begin Date: May 28, 2011
Test End Date: June 25, 2011

Report Issue Date: June 30, 2011


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**This report contains 18 pages**

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# 1 GENERAL

## 1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart E of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210 for a class II permissive change. The class II permissive change is to add the DRS X10gx host where the host can be configured to use either the internal antennas already approved for use with the module or an unapproved external antenna with X10 vehicle dock. This report provides data showing compliance of the external 5 dBi MGW-301-3C3C2C Mobile Mark Communications Antenna for use with the DRS X10gx and associated vehicle dock.

## 1.2 Product description

The 633ANHMW is an Intel® Centrino® Ultimate-N 6300 embedded IEEE 802.11a/b/g/n wireless network adapter that operates in the 2.4 GHz and 5.0 GHz spectrum. The module provides 3 antenna ports (Chains A, B, C) and is capable of delivering up to 450 Mbps.

| Mode of Operation | Frequency Range (MHz) | Number of Channels | Data Rates Supported Mbps |
|---|---|---|---|
| 802.11a | 5180 - 5240 | 4 | 6/36/54 |
| | 5260 - 5320 | 5 | 6/36/54 |
| | 5500 - 5700 | 5 | 6/36/54 |
| | 5745 - 5825 | 5 | 6/36/54 |
| 802.11n (20 MHz) | 5180 - 5240 | 4 | Up to 450 |
| | 5260 - 5320 | 5 | Up to 450 |
| | 5500 - 5700 | 5 | Up to 450 |
| | 5745 - 5825 | 5 | Up to 450 |
| 802.11n (40 MHz) | 5190 - 5230 | 2 | Up to 450 |
| | 5270 - 5310 | 2 | Up to 450 |
| | 5510 - 5690 | 5 | Up to 450 |
| | 5755 - 5795 | 2 | Up to 450 |

The 633ANHMW is implemented inside of a host tablet PC (X10gx) that also incorporates WWAN (EVDO and GSM) and Bluetooth modules, GOBI2000 and Castlenet BTC04R, respectively.

**Table 1.2- 1: Collocated Radios**

| Radio | Manufacturer | Model Number | FCC ID | IC |
|---|---|---|---|---|
| WWAN | DRS Tactical | GOBI2000 | UGLGOBI2 | 7888B-GOBI2 |
| Bluetooth | Castlenet | BTC04R | RK9-BTC04R | 4729A-BTC04R |

Manufacturer Information:

DRS Tactical Systems, Inc.
1110 W. Hibiscus Blvd.
Melbourne, FL 32901
(321) 727-3672

Test Sample Serial Number(s): G103000C6M000, G103000C4M000

Test Sample Condition: Good

### 1.3 Test Methodology and Considerations

The EUT was evaluated for radiated spurious emission measurements for the 802.11a/b/g/n configuration when used in conjunction with the 5 dBi MGW-301-3C3C2C Mobile Mark communications antenna with the X10 Vehicle RF Dock. The MGW-301-3C3C2C Mobile Mark communications antenna can be connected to only one port of the module (Chain A) through the X10 vehicle dock. Therefore, only Chain A was evaluated. The evaluation was performed at the channels listed in Table 1.3-1 below where the data rates described led to the worst case emissions.

Additionally, inter-modulation measurements for the collocated radios operating simultaneously were performed for the EUT configured with and without the external antenna. All inter-modulation emissions products generated by the simultaneous transmission of the collocated radios were found to be compliant.

The conformance of the EUT as a DTS is investigated in a separate certification document.

**Table 1.3-1: Configurations evaluated**

| Mode of Operation | Channel | Frequency (MHz) | Data Rates |
|---|---|---|---|
| 802.11a | 36 | 5180 | 6 Mbps |
| | 40 | 5200 | 6 Mbps |
| | 48 | 5240 | 6 Mbps |
| | 52 | 5260 | 6 Mbps |
| | 56 | 5280 | 6 Mbps |
| | 64 | 5320 | 6 Mbps |
| | 100 | 5500 | 6 Mbps |
| | 120 | 5600 | 6 Mbps |
| | 140 | 5700 | 6 Mbps |
| | 149 | 5745 | 6 Mbps |
| | 157 | 5785 | 6 Mbps |
| | 165 | 5825 | 6 Mbps |
| 802.11n (20 MHz) | 36 | 5180 | HT0 |
| | 40 | 5200 | HT0 |
| | 48 | 5240 | HT0 |
| | 52 | 5260 | HT0 |
| | 56 | 5280 | HT0 |
| | 64 | 5320 | HT0 |
| | 100 | 5500 | HT0 |
| | 120 | 5600 | HT0 |
| | 140 | 5700 | HT0 |
| | 149 | 5745 | HT0 |
| | 157 | 5785 | HT0 |
| | 165 | 5825 | HT0 |
| 802.11n (40 MHz - Wide) | 38 | 5190 | HT0 |
| | 46 | 5230 | HT0 |
| | 54 | 5270 | HT0 |
| | 62 | 5310 | HT0 |
| | 102 | 5510 | HT0 |
| | 118 | 5590 | HT0 |
| | 134 | 5670 | HT0 |
| | 151 | 5755 | HT0 |
| | 159 | 5795 | HT0 |

# 2 TEST FACILITIES

## 2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions, Inc.
3998 FAU Blvd, Suite 310
Boca Raton, Florida 33431
Phone: (561) 961-5585
Fax: (561) 961-5587
www.acstestlab.com

FCC Test Firm Registration #: 587595
Industry Canada Lab Code: 4175C

## 2.2 Radiated & Conducted Emissions Test Site Description

### 2.2.1 Semi-Anechoic Chamber Test Site

The EMC radiated test facility consists of an RF-shielded enclosure. The interior dimensions of the indoor semi-anechoic chamber are approximately 48 feet (14.6 m) long by 36 feet (10.8 m) wide by 24 feet (7.3 m) high and consist of rigid, 1/8 inch (0.32 cm) steel-clad, wood core modular panels with steel framing. In the shielded enclosure, the faces of the panels are galvanized and the chamber is self-supporting. 8-foot RF absorbing cones are installed on 4 walls and the ceiling. The steel-clad ground plane is covered with vinyl floor.

The turntable is driven by pneumatic motor, which is capable of supporting a 2000 lb. load. The turntable is flushed with the chamber floor which it is connected to, around its circumference, with a continuous metallic loaded spring. An EMCO Model 1050 Multi-device Controller controls the turntable position.

A pneumatic motor is used to control antenna polarizations and height relative to the ground. The height information is displayed on the control unit EMCO Model 1050.

The control room is an RF shielded enclosure attached to the semi-anechoic chamber with two bulkhead panels for connecting RF, and control cables. The dimension of the room is 7.3 m x 4.9 m x 3 m high and the entrance doors of both control and conducted rooms are 3 feet (0.91 m) by 7 feet (2.13 m).

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3.1-1 below:

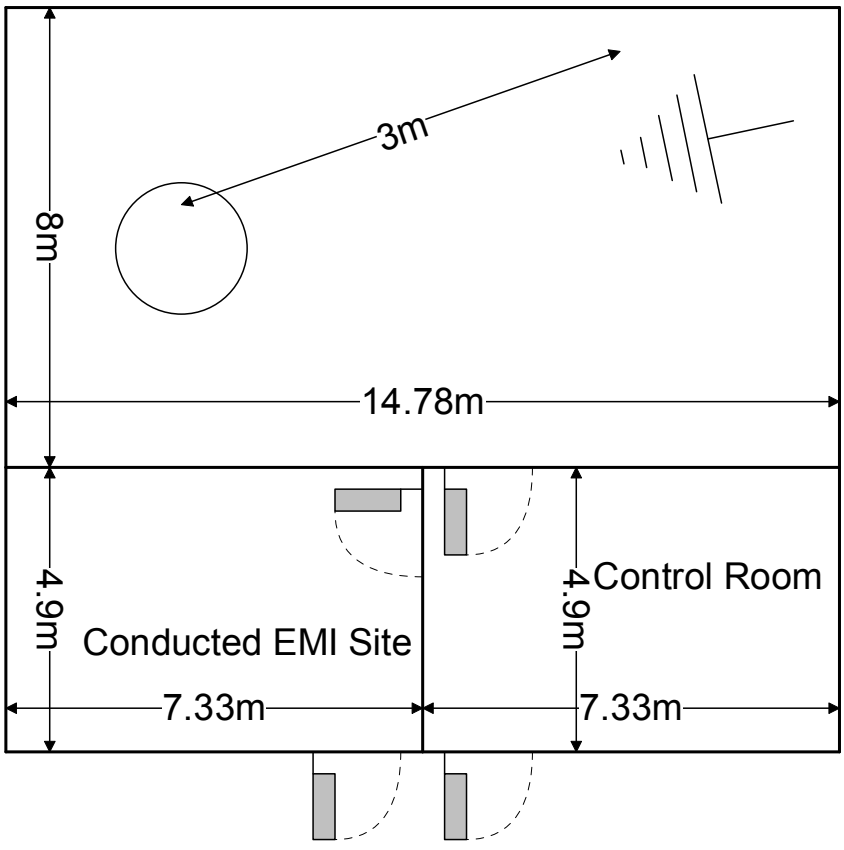


**Figure 2.3.1-1: Semi-Anechoic Chamber Test Site**

### 2.2.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are 7.3 x 4.9 x 3 $m^3$. As per ANSI C63.4 2003 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50 Ω/50 µH and an EMCO Model 3825, which are installed as shown in Photograph 3. For 220 V, 50 Hz, a Polarad LISN (S/N 879341/048) is used in conjunction with a 1 kVA, 50 Hz/220 V EDGAR variable frequency generator, Model 1001B, to filter conducted noise from the generator.

A diagram of the room is shown below in figure 2.3.2-1:

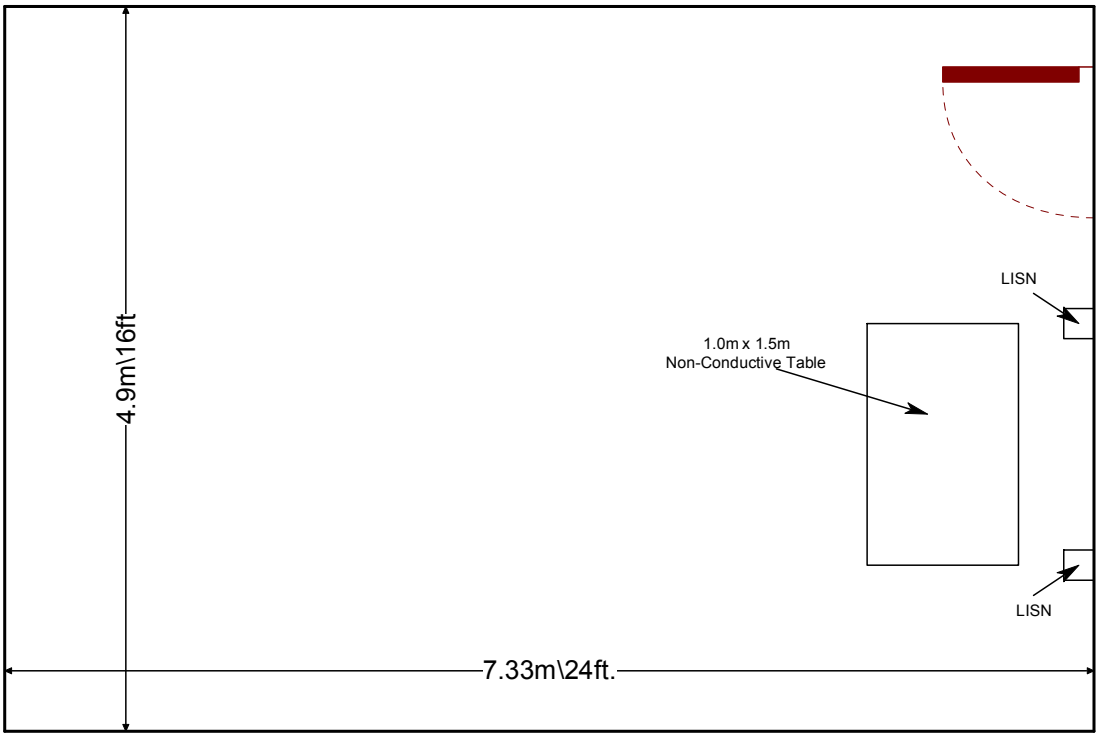


**Figure 2.3.2-1: AC Mains Conducted EMI Site**

## 3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2010
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart E: Unlicensed National Information Infrastructure Devices, 2010
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, December 2010.
- Industry Canada Radio Standards Specification: RSS-GEN - General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, December 2010.

## 4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

**Table 4-1: Test Equipment**

| AssetID | Manufacturer | Model # | Equipment Type | Serial # | Last Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|---|
| 524 | Chase | CBL6111 | Antennas | 1138 | 1/7/2011 | 1/7/2013 |
| 2081 | Hewlett Packard | 11975A | Amplifier | 2517A00669 | NCR | NCR |
| 2001 | Hewlett-Packard | 11971A | Mixer | 2332A01214 | 2/25/2011 | 2/25/2013 |
| 2006 | EMCO | 3115 | Antennas | 2573 | 3/2/2011 | 3/2/2013 |
| 2008 | COM-Power | AH-826 | Antennas | 81009 | NCR | NCR |
| 2011 | Hewlett-Packard | HP 8447D | Amplifiers | 2443A03952 | 1/3/2011 | 1/3/2012 |
| 2013 | Hewlett Packard | HP8566B | Spectrum Analyzers | 2407A03233 | 8/5/2010 | 8/5/2012 |
| 2014 | Hewlett Packard | HP 85650A | Quasi Peak Adapter | 2430A00559 | 8/5/2010 | 8/5/2012 |
| 2037 | ACS Boca | Chamber EMI Cable Set | Cable Set | 2037 | 1/7/2011 | 1/7/2012 |
| 2044 | QMI | N/A | Cables | 2044 | 1/7/2011 | 1/7/2012 |
| 523 | Agilent | E7405 | Spectrum Analyzers | MY45103293 | 1/5/2011 | 1/5/2013 |
| 2082 | Teledyne Storm Products | 90-010-048 | Cables | 2082 | 6/6/2011 | 6/6/2012 |
| 2012 | Hewlett-Packard | HP83017A | Amplifiers | 3123A00324 | 2/25/2011 | 2/25/2012 |
| 2070 | Mini Circuits | VHF-8400+ | Filter | 2070 | 2/3/2011 | 2/3/2012 |
| 335 | Suhner | SF-102A | Cables | 882/2A | 10/29/2010 | 10/29/2011 |
| 2076 | Hewlett Packard | HP5061-5458 | Cables | 2076 | 2/2/2011 | 2/2/2012 |
| 332 | Rohde&Schwarz | TS-PR40 | Amplifiers | 100021 | 10/29/2010 | 10/29/2011 |
| 333 | Rohde&Schwarz | 3160-09 | Antennas | 49404 | 11/4/2010 | NCR |

**NCR = No Cal Required**

*Note:
The assets 333 and 2008 are standard gain horn antennas. Hence, recurring calibration beyond initial calibration per the manufacturer is not required only in case of damage, suspected deterioration or use at distance closer than $2xa^2/\lambda$, as per ANSI C63.4 requirements.

## 5 SUPPORT EQUIPMENT

**Table 5-1: Support Equipment (External Antenna Path)**

| Item | Equipment Type | Manufacturer | Model Number | Serial Number |
|---|---|---|---|---|
| 1 | Host Device | DRS Tactical Systems | X10gx | G103000C6M000<br>G103000C4M000 |
| 2 | RF Car Dock | DRS Tactical Systems | Armor X10 Vehicle Dock | GX00411 |
| 3 | Antenna | Mobile Mark | MGW-301-3C3C2C | N/A |
| 4 | Keyboard | Dell | SK-8115 | CN-0DJ331-71616-93N-0792 |
| 5 | Mouse | Hewlett Packard | M859PU | BM81416122 |
| 6 | DC Power Supply | MPJA | HY5003 | 003700278 |

## 6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

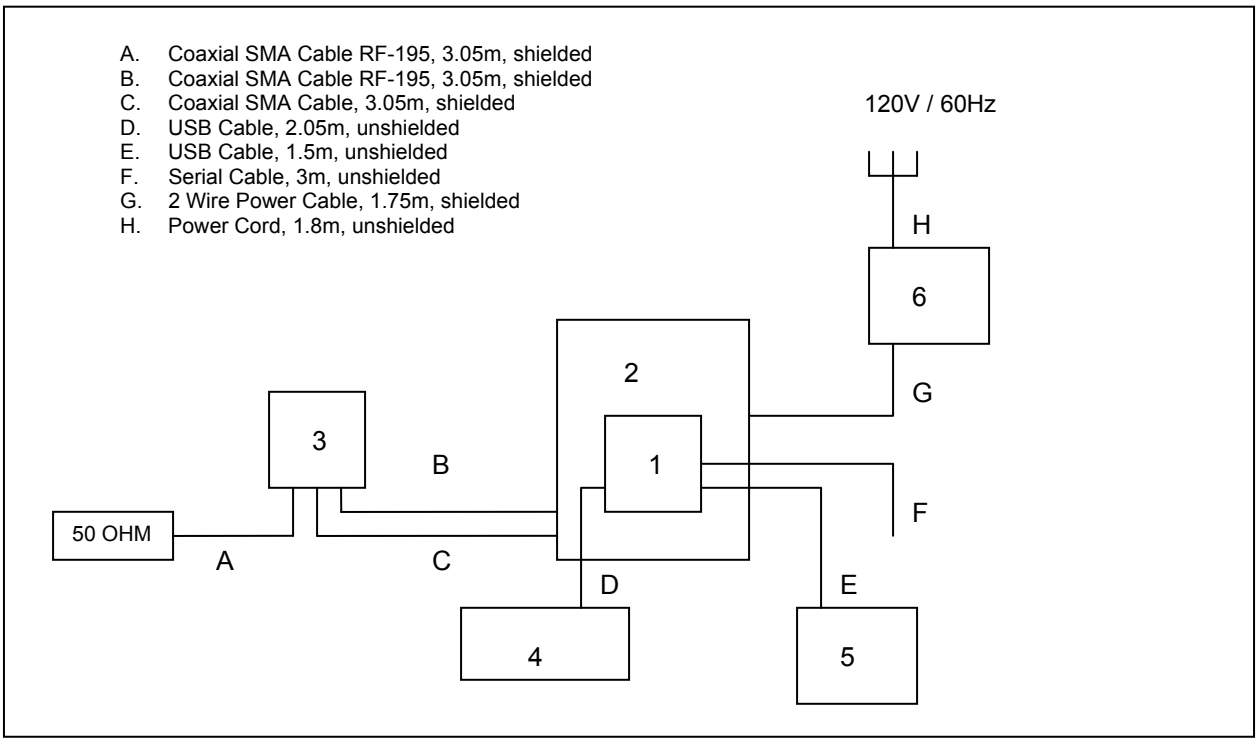


**Figure 6- 1: Test Setup Block Diagram – RF Vehicle Dock with External Antenna**

# 7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

## 7.1 Antenna Requirement – FCC: Section 15.203

The 633ANHMW uses a 5 dBi MGW-301-3C3C2C Mobile Mark communications antenna with the vehicle dock. The vehicle dock will provide an RP-SMA connector for the WLAN transceiver in order to meet the requirements of 15.203.

## 7.2 Radiated Spurious Emissions - FCC Sections 15.407(b), 15.205, 15.209, IC: RSS-210 2.5

### 7.2.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30 MHz to 40 GHz, 10 times the highest fundamental frequency or 40 GHz, for the 802.11a/n transmitters.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000MHz, peak and average measurements made with RBW and VBW of 1 MHz and 3MHz respectively.

### 7.2.2 Measurement Results

Radiated spurious emissions found in the band of 30 MHz to 40 GHz for the 802.11a/n transmitters are reported in the Tables 7.2.2-1 to 7.2.2-13 below.

**Table 7.2.2- 1: Radiated Emissions 30 MHz- 1 GHz**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **120.86** | 48.70 | 37.96 | H | -14.34 | --------- | 23.62 | -------- | 43.5 | --------- | 19.90 |
| **60.095** | 48.50 | 48.04 | H | -20.96 | --------- | 27.08 | -------- | 40.0 | --------- | 12.90 |
| **63.137** | 47.40 | 47.28 | H | -20.85 | --------- | 26.43 | -------- | 40.0 | --------- | 13.60 |
| **72.1005** | 50.50 | 50.40 | H | -20.04 | --------- | 30.36 | -------- | 40.0 | --------- | 9.60 |
| **87.1435** | 45.10 | 44.61 | H | -18.39 | --------- | 26.22 | -------- | 40.0 | --------- | 13.80 |
| **122.178** | 46.40 | 37.58 | H | -14.33 | --------- | 23.25 | -------- | 43.5 | --------- | 20.30 |
| **336.498** | 47.20 | 47.05 | H | -10.57 | --------- | 36.48 | -------- | 46.0 | --------- | 9.50 |
| **384.57** | 45.80 | 45.57 | H | -9.28 | --------- | 36.29 | -------- | 46.0 | --------- | 9.70 |
| **72.1045** | 49.10 | 48.88 | V | -20.04 | --------- | 28.84 | -------- | 40.0 | --------- | 11.20 |
| **75.1105** | 48.90 | 48.50 | V | -19.75 | --------- | 28.75 | -------- | 40.0 | --------- | 11.30 |
| **78.1355** | 49.80 | 49.32 | V | -19.37 | --------- | 29.95 | -------- | 40.0 | --------- | 10.10 |
| **84.1515** | 44.30 | 44.62 | V | -18.63 | --------- | 25.99 | -------- | 40.0 | --------- | 14.00 |
| **87.1415** | 48.60 | 48.18 | V | -18.39 | --------- | 29.79 | -------- | 40.0 | --------- | 10.20 |
| **90.1435** | 48.70 | 47.66 | V | -18.17 | --------- | 29.49 | -------- | 43.5 | --------- | 14.00 |
| **93.1815** | 45.30 | 44.92 | V | -17.50 | --------- | 27.42 | -------- | 43.5 | --------- | 16.10 |
| **96.186** | 43.70 | 42.27 | V | -16.89 | --------- | 25.38 | -------- | 43.5 | --------- | 18.10 |
| **119.374** | 45.75 | 37.40 | V | -15.21 | --------- | 22.19 | -------- | 43.5 | --------- | 21.30 |
| **143.979** | 40.00 | 38.99 | V | -14.68 | --------- | 24.31 | -------- | 43.5 | --------- | 19.20 |

* Note: The worst case radiated emissions in the 30 MHz – 1 GHz range for the EUT in continuous TX mode are reported above.

**Table 7.2.2- 2: 802.11a (5180 MHz to 5240 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5180 MHz)** | | | | | | | | | | |
| **5150** | 53.56 | 45.16 | H | 4.78 | 58.34 | 49.94 | 74.0 | 54.0 | 15.70 | 4.10 |
| **5150** | 54.24 | 45.84 | V | 4.78 | 59.02 | 50.62 | 74.0 | 54.0 | 15.00 | 3.40 |
| **6906.6** | 42.94 | --- | V | 6.77 | 49.71 | --- | 68.2 | --- | 18.49 | --- |
| **10360** | 41.15 | --- | H | 12.21 | 53.36 | --- | 68.2 | --- | 14.84 | --- |
| **10360** | 41.06 | --- | V | 12.21 | 53.27 | --- | 68.2 | --- | 14.93 | --- |
| **Middle Channel (5200 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |
| **High Channel (5240 MHz)** | | | | | | | | | | |
| **3785.378** | 40.04 | 27.89 | H | 1.36 | 41.40 | 29.24 | 74.0 | 54.0 | 32.6 | 24.8 |
| **7395** | 40.00 | 28.82 | V | 8.03 | 48.03 | 36.85 | 74.0 | 54.0 | 26.0 | 17.1 |

*Notes:

- All emissions above 10360 MHz were attenuated below the permissible limit and the noise floor.
- Emissions outside of the restricted band are compared to the limits of 68.2 dBµV/m at 3 m corresponding to -27 dBm/MHz EIRP.

**Table 7.2.2- 3: 802.11a (5260 MHz to 5320 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5260 MHz)** | | | | | | | | | | |
| **3895.617** | 39.88 | 28.35 | H | 1.80 | 41.68 | 30.16 | 74.0 | 54.0 | 32.3 | 23.8 |
| **Middle Channel (5280 MHz)** | | | | | | | | | | |
| **3950.035** | 39.31 | 27.55 | H | 2.03 | 41.33 | 29.57 | 74.0 | 54.0 | 32.7 | 24.4 |
| **7039.966** | 44.08 | --- | V | 7.18 | 51.26 | --- | 68.2 | --- | 16.94 | --- |
| **High Channel (5320 MHz)** | | | | | | | | | | |
| **5350** | 52.09 | 44.42 | H | 5.17 | 57.26 | 49.59 | 74.0 | 54.0 | 16.70 | 4.40 |
| **5350** | 55.15 | 45.22 | V | 5.17 | 60.32 | 50.39 | 74.0 | 54.0 | 13.70 | 3.60 |

* Notes:

- All emissions above 7039.966 MHz were attenuated below the permissible limit and the noise floor.
- Emissions outside of the restricted band are compared to the limits of 68.2 dBµV/m at 3 m corresponding to -27 dBm/MHz EIRP.

**Table 7.2.2- 4: 802.11a (5500 MHz to 5700 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5500 MHz)** | | | | | | | | | | |
| **5460** | 47.20 | 38.59 | H | 5.70 | 52.90 | 44.29 | 74.0 | 54.0 | 21.10 | 9.70 |
| **5460** | 48.47 | 40.13 | V | 5.70 | 54.17 | 45.83 | 74.0 | 54.0 | 19.80 | 8.20 |
| **8539.14** | 40.18 | --------- | H | 10.21 | 50.39 | --------- | 68.2 | --------- | 17.81 | --------- |
| **Middle Channel (5600 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |
| **High Channel (5700 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |

* Notes:

- All emissions above 8539.14 MHz were attenuated below the permissible limit and the noise floor.
- Emissions outside of the restricted band are compared to the limits of 68.2 dBµV/m at 3 m corresponding to -27 dBm/MHz EIRP.

**Table 7.2.2- 5: 802.11a (5745 MHz to 5825 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5745 MHz)** | | | | | | | | | | |
| **5999.85** | 41.49 | --------- | H | 5.73 | 47.22 | --------- | 68.2 | --------- | 20.98 | --------- |
| **8541.38** | 39.51 | --------- | H | 9.19 | 48.69 | --------- | 68.2 | --------- | 19.51 | --------- |
| **Middle Channel (5785 MHz)** | | | | | | | | | | |
| **5999.92** | 41.49 | --------- | H | 5.73 | 47.22 | --------- | 68.2 | --------- | 20.98 | --------- |
| **High Channel (5825 MHz)** | | | | | | | | | | |
| **3795.583** | 39.98 | 27.91 | H | 1.40 | 41.38 | 29.31 | 74.0 | 54.0 | 32.6 | 24.7 |

* Notes:

- All emissions above 8541.38 MHz were attenuated below the permissible limit and the noise floor.
- Emissions outside of the restricted band are compared to the limits of 68.2 dBµV/m at 3 m corresponding to -27 dBm/MHz EIRP.

**Table 7.2.2- 6: 802.11n – 20 MHz (5180 MHz to 5240 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5180 MHz)** | | | | | | | | | | |
| **5150** | 53.28 | 44.58 | H | 4.78 | 58.06 | 49.36 | 74.0 | 54.0 | 15.90 | 4.60 |
| **5150** | 56.12 | 47.64 | V | 4.78 | 60.90 | 52.42 | 74.0 | 54.0 | 13.10 | 1.60 |
| **6906.74** | 43.21 | --- | V | 6.51 | 49.71 | --- | 68.2 | --- | 18.49 | --- |
| **8306.63** | 39.45 | --- | V | 8.68 | 48.13 | --- | 68.2 | --- | 20.07 | --- |
| **Middle Channel (5200 MHz)** | | | | | | | | | | |
| **6933.32** | 44.18 | --- | V | 6.53 | 50.71 | --- | 68.2 | --- | 17.49 | --- |
| **High Channel (5240 MHz)** | | | | | | | | | | |
| **6986.6** | 44.29 | --- | V | 6.63 | 50.92 | --- | 68.2 | --- | 17.28 | --- |

* Notes:

- All emissions above 8306.63 MHz were attenuated below the permissible limit and the noise floor.
- Emissions outside of the restricted band are compared to the limits of 68.2 dBµV/m at 3 m corresponding to -27 dBm/MHz EIRP.

**Table 7.2.2- 7: 802.11n – 20 MHz (5260 MHz to 5320 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5260 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |
| **Middle Channel (5280 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |
| **High Channel (5320 MHz)** | | | | | | | | | | |
| **5350** | 50.64 | 41.21 | H | 5.17 | 55.81 | 46.38 | 74.0 | 54.0 | 18.20 | 7.60 |
| **5350** | 55.78 | 47.35 | V | 5.17 | 60.95 | 52.52 | 74.0 | 54.0 | 13.00 | 1.50 |

* Note: All emissions above 5350 MHz were attenuated below the permissible limit and the noise floor.

**Table 7.2.2- 8: 802.11n – 20 MHz (5500 MHz to 5700 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5500 MHz)** | | | | | | | | | | |
| **5460** | 48.09 | 39.74 | H | 5.39 | 53.48 | 45.13 | 74.0 | 54.0 | 20.50 | 8.90 |
| **5460** | 49.59 | 40.48 | V | 5.39 | 54.98 | 45.87 | 74.0 | 54.0 | 19.00 | 8.10 |
| **5999.89** | 41.70 | --- | H | 5.73 | 47.43 | --- | 68.2 | --- | 20.77 | --- |
| **Middle Channel (5600 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |
| **High Channel (5700 MHz)** | | | | | | | | | | |
| **3970.27** | 38.69 | 27.62 | H | 2.11 | 40.80 | 29.73 | 74.0 | 54.0 | 33.2 | 24.3 |

* Notes:

- All emissions above 5999.89 MHz were attenuated below the permissible limit and the noise floor.
- Emissions outside of the restricted band are compared to the limits of 68.2 dBµV/m at 3 m corresponding to -27 dBm/MHz EIRP.

**Table 7.2.2- 9: 802.11n – 20 MHz (5745 MHz to 5825 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5745 MHz)** | | | | | | | | | | |
| **3783.72** | 39.33 | 27.61 | H | 1.35 | 40.69 | 28.96 | 74.0 | 54.0 | 33.3 | 25.0 |
| **Middle Channel (5785 MHz)** | | | | | | | | | | |
| **3795.392** | 39.36 | 27.83 | H | 1.40 | 40.76 | 29.23 | 74.0 | 54.0 | 33.2 | 24.8 |
| **High Channel (5825 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |

* Note: All emissions above 5825 MHz were attenuated below the permissible limit and the noise floor.

**Table 7.2.2- 10: 802.11n – 40 MHz Wide (5190 MHz to 5230 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5190 MHz)** | | | | | | | | | | |
| **5150** | 55.49 | 39.13 | H | 4.78 | 60.27 | 43.91 | 74.0 | 54.0 | 13.70 | 10.10 |
| **5150** | 55.05 | 38.79 | V | 4.78 | 59.83 | 43.57 | 74.0 | 54.0 | 14.20 | 10.40 |
| **High Channel (5230 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |

* Note: All emissions above 5230 MHz were attenuated below the permissible limit.

**Table 7.2.2- 11: 802.11n – 40 MHz Wide (5270 MHz to 5310 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5270 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |
| **High Channel (5310 MHz)** | | | | | | | | | | |
| **5350** | 62.71 | 42.01 | H | 5.17 | 67.88 | 47.18 | 74.0 | 54.0 | 6.10 | 6.80 |
| **5350** | 56.31 | 35.99 | V | 5.17 | 61.48 | 41.16 | 74.0 | 54.0 | 12.50 | 12.80 |

* Note: All emissions above 5350 MHz were attenuated below the permissible limit.

**Table 7.2.2- 12: 802.11n – 40 MHz Wide (5510 MHz to 5670 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| **Low Channel (5510 MHz)** | | | | | | | | | | |
| **5460** | 52.28 | 34.89 | H | 5.39 | 57.67 | 40.28 | 74.0 | 54.0 | 16.30 | 13.70 |
| **5460** | 52.42 | 34.50 | V | 5.39 | 57.81 | 39.89 | 74.0 | 54.0 | 16.20 | 14.10 |
| **Middle Channel (5590 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |
| **High Channel (5670 MHz)** | | | | | | | | | | |
| **Noise Floor** | | | | | | | | | | |

* Note: All emissions above 5670 MHz were attenuated below the permissible limit and the noise floor.

**Table 7.2.2- 13: 802.11n – 40 MHz Wide (5755 MHz to 5795 MHz)**

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity | Correction Factors | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pk | Qpk/Avg | (H/V) | (dB) | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg |
| Low Channel (5755 MHz) | | | | | | | | | | |
| Noise FLoor | | | | | | | | | | |
| High Channel (5795 MHz | | | | | | | | | | |
| Noise Floor | | | | | | | | | | |

* Note: All emissions above 5795 MHz were attenuated below the permissible limit and the noise floor.

### *7.2.2.1* Sample Calculation:

$R_C = R_U + CF_T$

Where:

| | | |
|---|---|---|
| $CF_T$ | = | Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only) |
| $R_U$ | = | Uncorrected Reading |
| $R_C$ | = | Corrected Level |
| AF | = | Antenna Factor |
| CA | = | Cable Attenuation |
| AG | = | Amplifier Gain |
| DC | = | Duty Cycle Correction Factor |

**Example Calculation: Peak**
Corrected Level: 52.28 + 5.39 = 57.67dBuV/m
Margin: 74 dBuV/m – 57.67dBuV/m = 16.3dB

**Example Calculation: Average**
Corrected Level: 34.89 + 5.39 - 0= 40.28dBuV/m
Margin: 54 dBuV/m – 40.28 dBuV/m = 13.7dB

## 8 CONCLUSION

In the opinion of ACS, Inc. the 633ANHMW, manufactured by DRS Tactical Systems, Inc. meets the requirements of FCC Part 15 subpart E and Industry Canada's Radio Standards Specification RSS-210.

# END REPORT