APPLICANT: ADCON TELEMETRY, INC.

FCC ID: MQXB900SS-500

TABLE OF CONTENTS

TEST REPORT CONTAINING:

EXHIBIT ATTACHMENTS:

TEST PROCEDURES

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC. The UUT was transmitting a test signal during the testing.

15.247(a)(1) CARRIER FREQUENCY SEPARATION & NUMBER OF CHANNELS: A near field probe was used to sense the signal of the UUT. The UUT was made to hop its full range. The spectrum analyzer was set to view the frequency range from 902 to 928 MHz and placed in the memory mode. A plot (Page #5) was then made of the display showing the number of channels, 50 and the separation of the channels, 150 kHz.

15.247(a)(1)(i) CARRIER FREQUENCY DWELL TIME: A near field probe was used to sense the signal of the UUT. The UUT was made to hop its full range. The spectrum analyzer was set to view the frequency range from 902 to 928MHz and the center of the HOPPING RANGE was centered on the Spectrum Analyzer. The SPAN was then set to ZERO(0) and the SWEEP TIME was set to 20 seconds. Then by analyzing the plot of the total ON TIME of the UUT during the 20 seconds it was determined the dwell time on any frequency was less than 0.4 seconds, 136 mseconds.
See page #'s 7-8.

15.247(b)(2) POWER OUTPUT: The RF power output was measured at the antenna feed point by removing the permanent antenna and connecting the UUT to a peak power meter, HP Model No. 8900C.

15.247(c) ANTENNA CONDUCTED EMISSIONS: The RBW=100 kHz, VBW =1.0 MHz up to 1000 MHz and RBW=1.0 MHz & VBW=3.0 MHz above 1.0GHz. The spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz up to 1.0 GHz and 1.0 MHz with a video BW of 3.0 MHz above 1.0 GHz. The ambient temperature of the UUT was 72°F with a humidity of 54%. The hopping was stopped at the low end, middle and high end of the band in order to test the radiated emissions.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed. The ambient temperature of the UUT was 78°F with a humidity of 54%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz)	METER READING + ACF = FS
33	20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

TEST EQUIPMENT LIST

1. Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/ preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter HP 8565OA, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02, S/N 3008A00372
2. Biconnical Antenna: Eaton Model 94455-1, S/N 1057
3. Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171
4. Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
5. Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 409
6. Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180, 1-18 GHz, S/N 2319
7. 18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20
8. Horn 40-60GHz: ATM Part #19-443-6R
9. Line Impedance Stabilization Network: Electro-Metrics Model ANS-25/2, S/N 2604
10. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
11. Frequency Counter: HP Model 5385A, S/N 3242A07460
12. Peak Power Meter: HP Model 8900C, S/N 2131A00545
13. Open Area Test Site #1-3meters
14. Signal Generator: HP 8640B, S/N 2308A21464
15. Signal Generator: HP 8614A, S/N 2015A07428
16. Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N 9706-1211
17. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153
18. AC Voltmeter: HP Model 400FL, S/N 2213A14499
19. Digital Multimeter: Fluke Model 8012A, S/N 4810047
20. Digital Multimeter: Fluke Model 77, S/N 43850817
21. Oscilloscope: Tektronix Model 2230, S/N 300572

APPLICANT: ADCON TELEMETRY, INC.
FCC ID: MQXB900SS-500

INTRODUCTION: GENERAL INFORMATION AND DATA

PRODUCT DESCRIPTION The MQXB900SS-500 is a frequency hopping radio, and interface to be used as a module for incorporation. The controller is responsible for all interfacing and receives and responds to all incoming events.

ANTENNA: The MQXB900SS-500 incorporates a permanently attached antenna. This device is being sold with one of three antennas which are being purchased from an antenna manufacturer and are being permanently attached via a coax cable. These will be the only antennas available to be used with this unit.

Make model and description of each including the gain if any of each.

Cushcraft Corp. S8963B omnidirectional gain = 3 dBd
Cushcraft Corp. PC904N directional yagi gain = 6 dBd
Siemens Ltd. RA-10102(S151-003/A-1) dipole gain = 0 dBd

THIS DEVICE CONFORMS TO DA 00-1407, RELEASED JUNE 26, 2000 AS BELOW:

1. This FCC ID: MQXB900SS-500 has it's own RF shielding. Exhibit #5A shows the top view of the module with shielding. Exhibit # 5B shows the bottom view of the module.

2. To show that this module complies with part 15 requirements that under conditions of excessive data rates, the Texas Instruments processor data sheets show that the I/O lines brought out to the interface connector are buffered. See Exhibits 8A-8B.

3. The schematics in Exhibits 6A-6C show the onboard power supply regulators. This shows that the module complies with the requirements that regardless of the design of the power supply circuitry into which the module is installed that the module characteristics won’t change.

4. This device was tested in a stand-alone configuration. Please refer to the test set up photos. The module does not contain ferrites on any of it's leads.

5. You will also find enclosed a copy of the instructions which will be included with the modular transmitter.

15.247(a): Definition: This EUT uses a pseudo random algorithm to hop over the frequency range of 902.87 to 910.23MHz in 50 hops.

15.247(a)(1): The number of hops is 50 hops at a separation of 150 kHz, the requirement in the 902-928 MHz band is a minimum of 50.

15.247(a): Channel Frequency Separation: The channel frequency separation is 150 kHz.

15.247(a)(1)(i): Dwell Time of Hop: The Dwell time of any hopping frequency cannot be greater than 0.4 seconds in any 20 second period. The Dwell time in 20 seconds is .34 seconds.

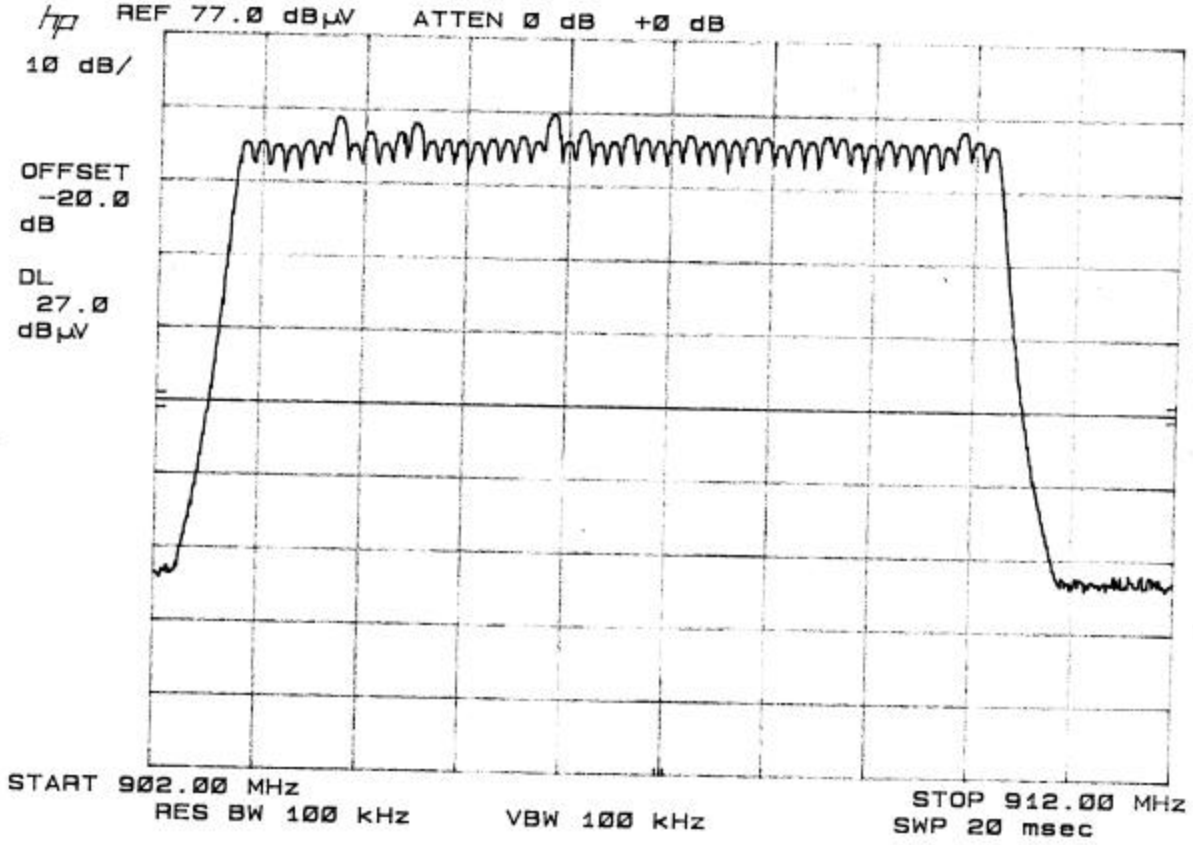
15.247(h): Once the radios have been configured and completed the "acquisition procedure", the radios in the network operate completely independent of any other radios in the local area. Eight different hopping tables are available for each network, and this provides an additional method to minimize collisions between networks.

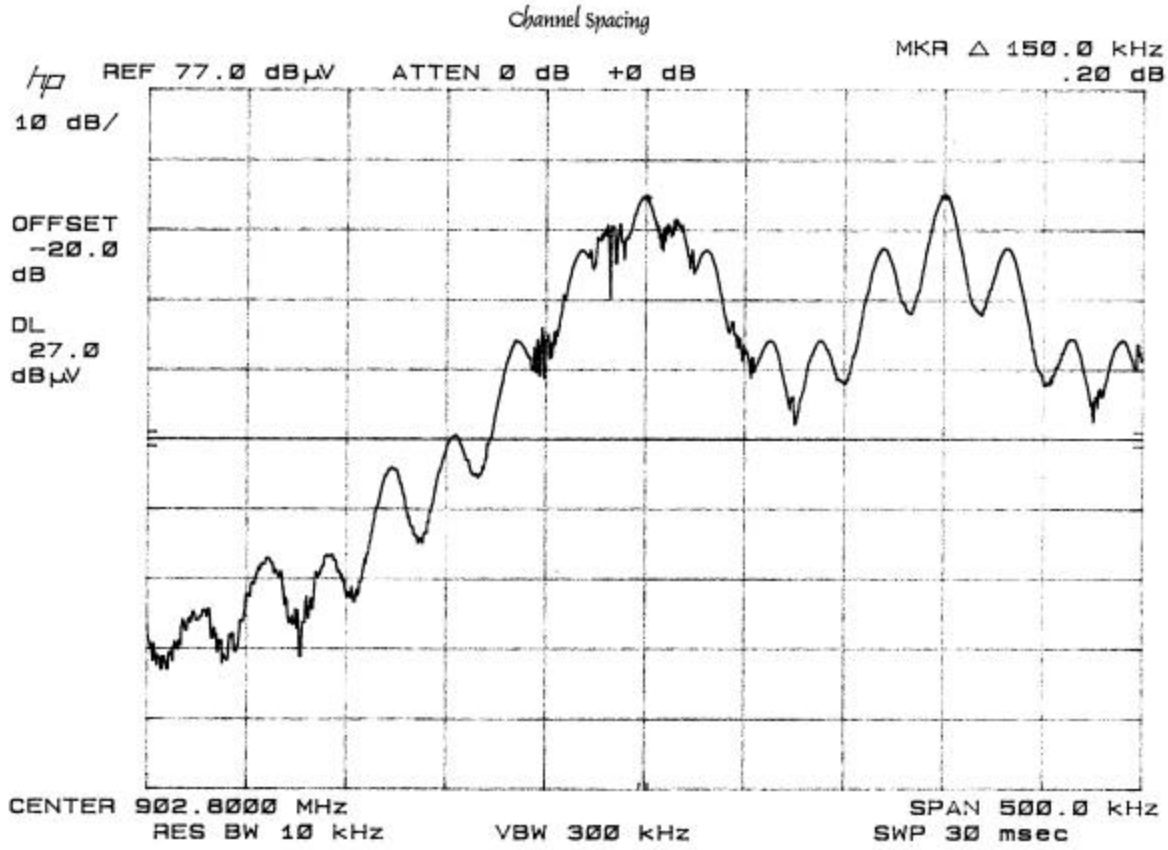
15.247(a)(1): The 8 pseudorandom hopping tables are burned into EEPROM memory, and do not change. All 8 tables have the following characteristics: they use each channel only once per 50 hops, and they move randomly both in direction and in number of channels hopped. They were derived from the following procedure: The first three tables were created with an algorithm "maximal-length pseudorandom linear feedback shift register (LFSR)" based on maximum lengths of 6,7,8 bits, with rejection of frequencies already used. The other tables (tables 4-8) were created with an algorithm based on the RANDOM()function, with rejection of frequencies already used.

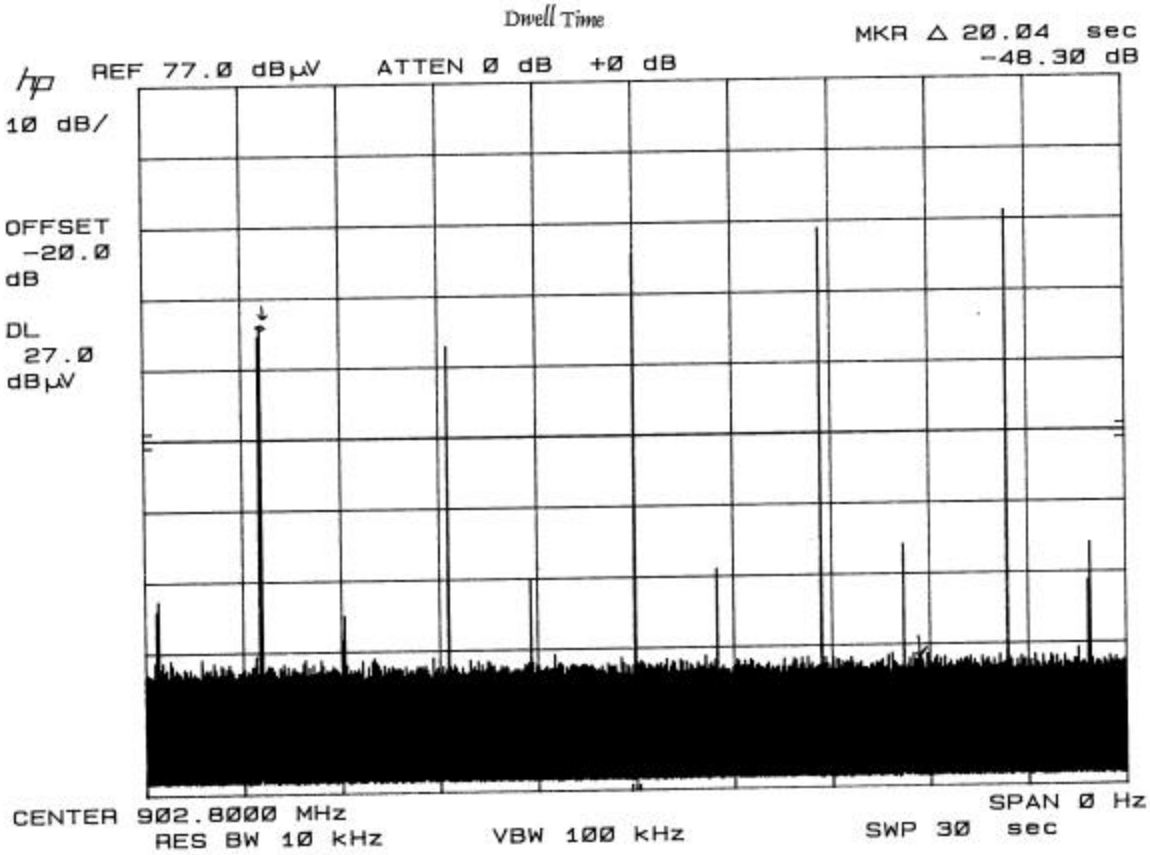
15.247(a)(1): Each frequency must be used equally on average by each transmitter. The next transmission starts with the next channel in the hopping table sequence. For example, if a short transmission starts with the first channel in the hopping table and needs only 8 hops to complete the transmission, the next transmission will start with the ninth channel in the hopping table sequence.

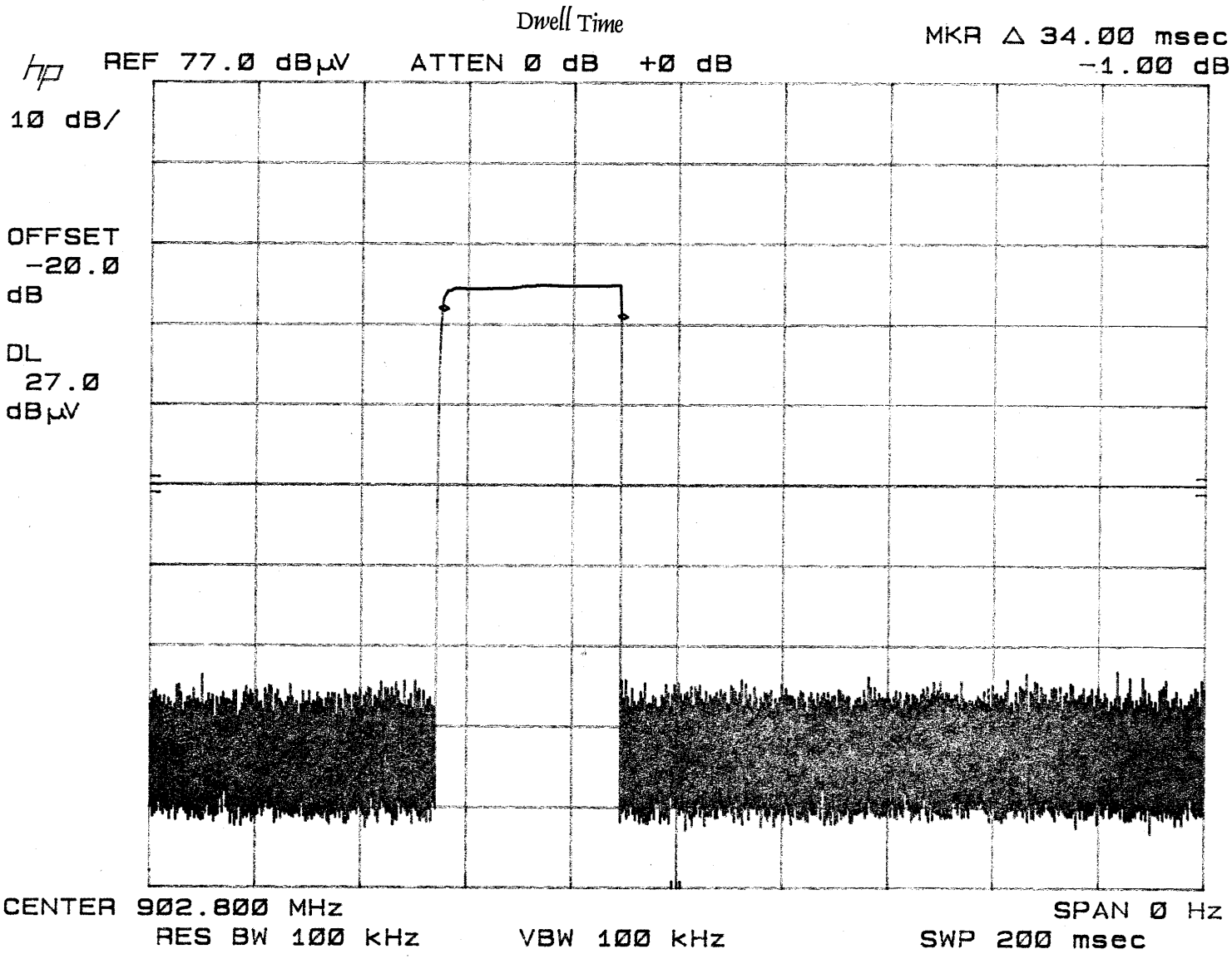
15.247(a)(1): The system receiver shall have an input bandwidth that match the hopping channels and shall shift frequencies in synchronization with the transmitted signals. The receiver uses a VCO to rapidly shift frequencies in synchronization with the transmitted signals, based on the hopping table that was chosen during the acquisition procedure. When a packet is repeated, it is transmitted on the next hopping channel, which is a different frequency. The receiver input bandwidth is limited by the filters on the receiver, which have a pass band of +/- 50 kHz at 3 dB. The adjacent channel rejection is 20 dB. The receiver shifts frequencies with the following procedure: After changing to a new hopping frequency, the microcontroller sends a command to the VCO to shift frequencies. It waits until the VCO has stabilized, then activates the receiver chip, and starts to process the data from the received signals.

Number of Hopping Channels




Channel Spacing
MKR Δ 150.0 kHz
REF 77.0 dBµV
ATTEN 0 dB +0 dB
.20 dB
10 dB/
OFFSET
-20.0
dB
DL
27.0
dBµV
CENTER 902.8000 MHz
SPAN 500.0 kHz
RES BW 10 kHz
VBW 300 kHz
SWP 30 msec


Dwell Time
MKR Δ 20.04 sec
-48.30 dB
REF 77.0 dBμV
ATTEN 0 dB +0 dB
10 dB/
OFFSET
-20.0
dB
DL
27.0
dBμV
CENTER 902.8000 MHz
RES BW 10 kHz
VBW 100 kHz
SPAN 0 Hz
SWP 30 sec



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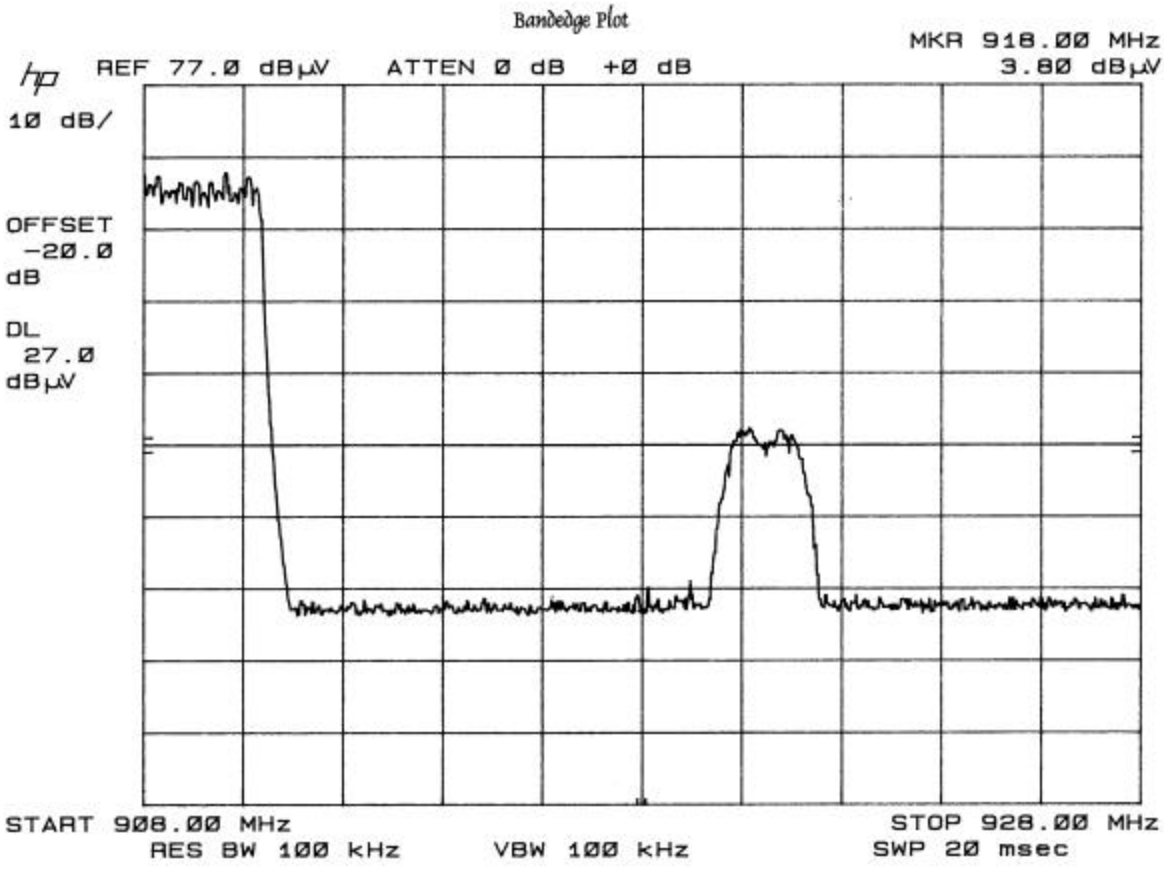
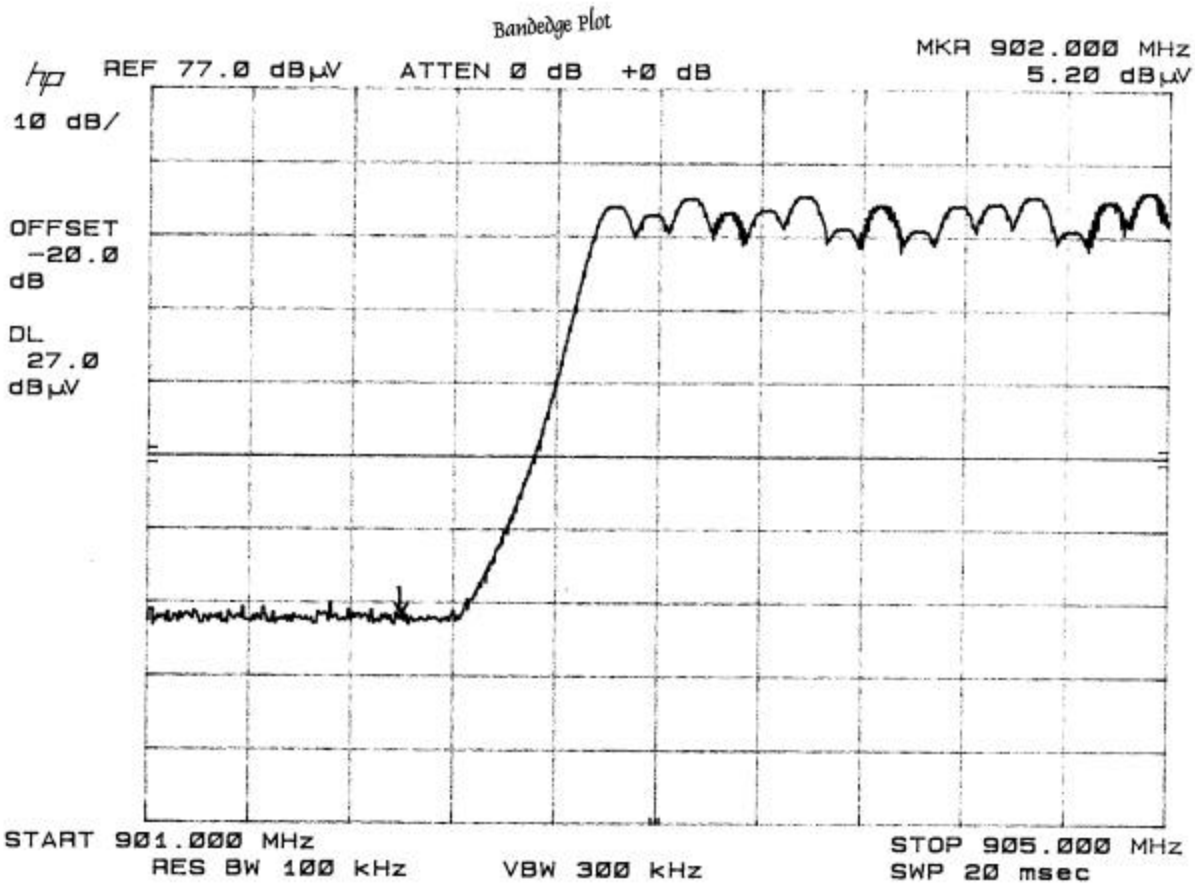
Bandedge Plot



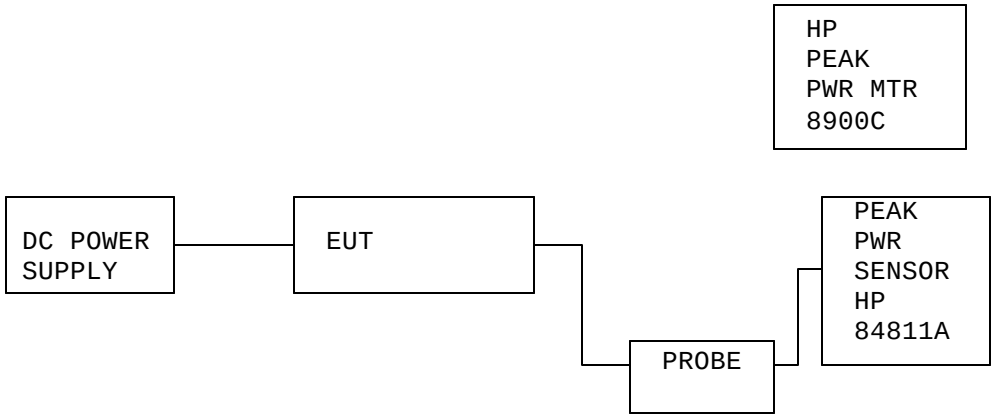

Bandedge Plot
REF 77.0 dBµV
ATTEN 0 dB +0 dB
MKR 902.000 MHz
5.20 dBµV
10 dB/
OFFSET
-20.0
dB
DL
27.0
dBµV
START 901.000 MHz
RES BW 100 kHz
VBW 300 kHz
STOP 905.000 MHz
SWP 20 msec

15.247(b)(2): POWER OUTPUT

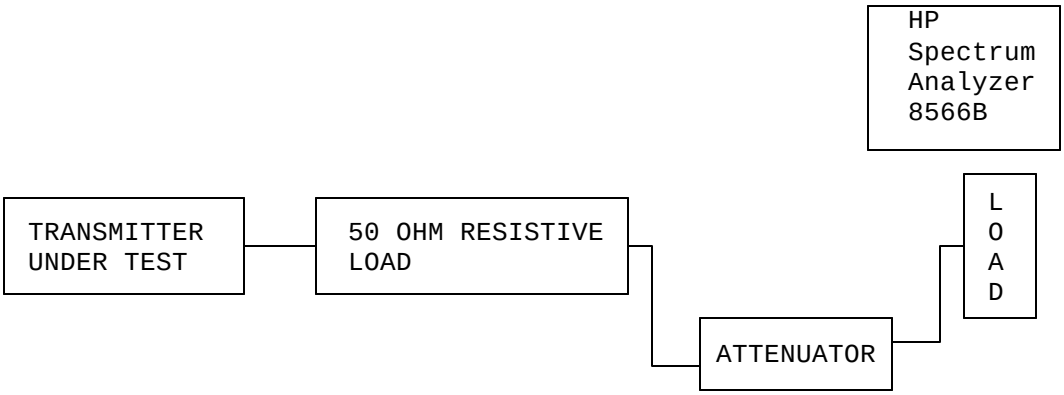
The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi the are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum power output was less than +30 dBm. Power was measured by disconnecting the antennas and measuring across a 50 ohm load as recommended by the manufacturer using a HP peak power meter Model 8900C. The antennas are non directional and do not exceed 6 dBi gain. The power output was measured at three places in the band highest is reported below.

MEASUREMENT: .42 WATTS



15.247(c) Method of Measuring RF Conducted Spurious Emissions



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

EMISSION FREQUENCY	dB below carrier
909	0
1818	66.3
2727	91.9
3636	100.1
4545	85.9
5454	107.9
6363	112
7272	121.1
8181	117.1
9090	120.1

NOTE: THE SPECTRUM WAS SCANNED TO THE TENTH HARMONIC.

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NAME OF TEST: RADIATION INTERFERENCE

RULES PART NUMBER: 15.247, 15.209

REQUIREMENTS:

FIELD STRENGTH of Fundamental:	FIELD STRENGTH of Harmonics	S15.209
		30 - 88 MHz 40 dBuV/m @3M
		88 -216 MHz 43.5
902-928MHz		216 -960 MHz 46
127.38dBuV/m @3m	54 dBuV/m @3m	ABOVE 960 MHz 54dBuV/m

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 50 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

TEST RESULTS: This unit DOES meet the FCC requirements.

TEST DATA:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuv	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuv/m	Margin dB
With	Small	Dipole					
909.00	909.00	93.1	V	4.00	24.79	121.89	5.49
909.00	1,818.00	25.4	V	2.81	28.42	56.63	20.75
909.00	2,727.00R	17.4	V	3.58	29.80	50.78	3.22
909.00	3,636.00R	4.2	V	4.44	31.62	40.26	13.74
909.00	4,545.00R	9.2	V	5.56	33.56	48.32	5.68
909.00	5,454.00R	-0.6	V	6.36	34.30	40.06	13.40
With Omni	Dipole						
909.00	909.00	96.3	V	4.00	24.79	125.09	2.29
909.00	1,818.00	23.8	V	2.81	28.42	55.03	23.38
909.00	2,727.00R	7.7	V	3.58	29.80	41.08	12.92
909.00	4,545.00R	5.8	H	5.56	33.56	44.92	9.08
With	Yagi						
909.00	909.00	97.3	H	4.00	24.79	126.09	1.29
909.00	1,818.00	28.7	H	2.81	28.42	59.93	17.45
909.00	2,727.00R	17.2	V	3.51	29.80	50.58	3.42
909.00	3,636.00R	1.8	V	4.44	31.62	37.86	16.14
909.00	4,545.00R	11.3	V	5.56	33.56	50.42	3.58

APPLICANT: ADCON TELEMETRY, INC.

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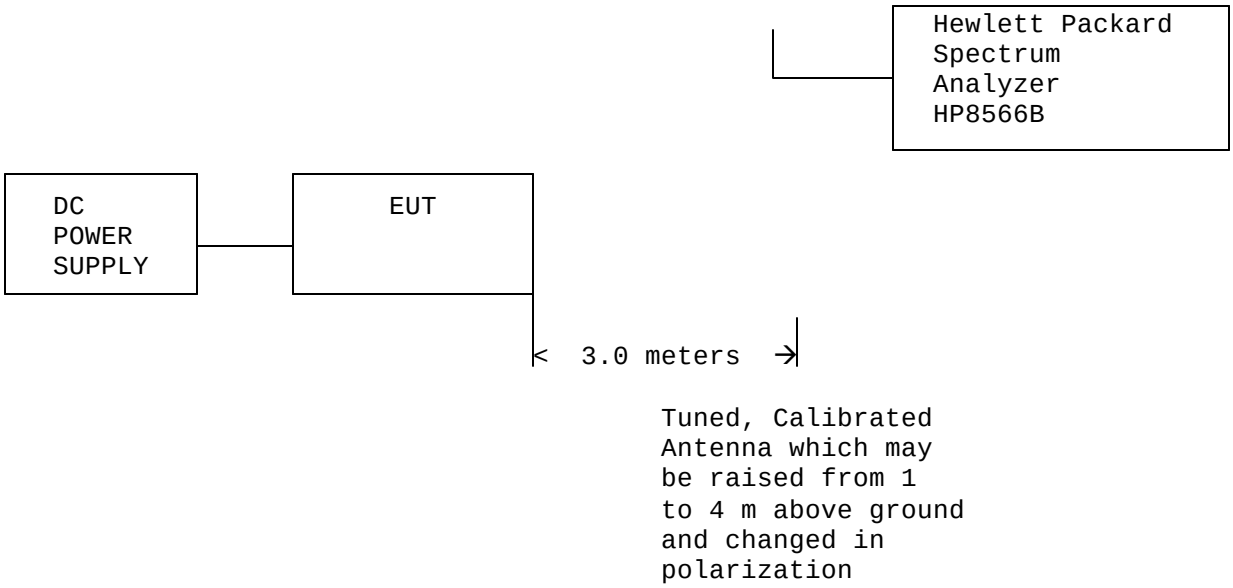
NAME OF TEST: RADIATION INTERFERENCE CONTINUED

RULES PART NUMBER: 15.247, 15.209

TEST PROCEDURE: ANSI STANDARD C63.4-1992 as described on previous page.

2.993(a)(b) Continued Field_strength_of_spurious_emissions:

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotatable platform.