

APPLICANT: ADCON TELEMETRY, INC.

FCC ID: MQXD900SS-20-A

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## TEST PROCEDURE

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 910MHz and placed in the memory mode. A plot (Exhibit #9) was then made of the display showing the number of channels, 50 and the separation of the channels, 152 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 928 MHz 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, 23.70 mseconds. See exhibit #11.

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=100kHz, VBW =1.0MHz up to 1000MHz and RBW=1.0MHz & VBW=3.0MHz above 1.0GHz. The spectrum was scanned from 30MHz 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 100kHz and the video bandwidth was 300 kHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0 GHz. The ambient temperature of the UUT was 72.2°F with a humidity of 54.2%. 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 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 74°F with a humidity of 54%.

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## TEST PROCEDURES CONTINUED

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 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02, S/N 3008A00372 Cal. 10/17/00
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 Cal. 2/9/00
10. ☐ Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
11. ☐ Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/00
12. ☐ Peak Power Meter: HP Model 8900C, S/N 2131A00545
13. ☒ Open Area Test Site #1-3meters Cal. 12/22/99
14. ☐ Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/00
15. ☐ Signal Generator: HP 8614A, S/N 2015A07428
16. ☐ Passive Loop Antenna: EMC0 Model 6512, 9KHz to 30MHz, S/N 9706-1211 Cal. 6/10/00
17. ☐ Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153 Cal. 11/24/00
18. ☐ AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/00
19. ☐ Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/00
20. ☐ Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/00
21. ☐ Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/00

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INTRODUCTION: GENERAL INFORMATION AND DATA

ANTENNA: The MQXD900SS-20-A incorporates a permanent antenna having less than 1 dBi gain. The antenna is permanently epoxied in place. This antenna is the only antenna to be used with this unit. The antenna as installed has a negative gain factor because of the inadequate ground plane.

PRODUCT DESCRIPTION The MQXD900SS-20-A is a frequency hopping radio, and interface to be used as a development tool. It consists of several separate blocks. The controller is responsible for all interfacing and receives and responds to all incoming events.

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 902-928MHz band is a minimum of 50.

15.247(a) Channel Frequency Separation: See exhibit #10, the channel frequency separation is 152kHz.

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 .39 seconds.

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NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE

RULES PART NUMBER: 15.207

MINIMUM REQUIREMENTS:	FREQUENCY	LEVEL
	__MHz__	_uV_
	0.450-30	250

TEST PROCEDURE: ANSI STANDARD C63.4-1992

THE HIGHEST EMISSION READ FOR LINE 1 WAS 216.00 uV @ 8.37 MHz.

THE HIGHEST EMISSION READ FOR LINE 2 WAS 213.53 uV @ 8.78 MHz.

THE ATTACHED GRAPHS, EXHIBIT 8A & 8B, REPRESENT THE EMISSIONS READ FOR POWER LINE CONDUCTED FOR THIS DEVICE.

TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

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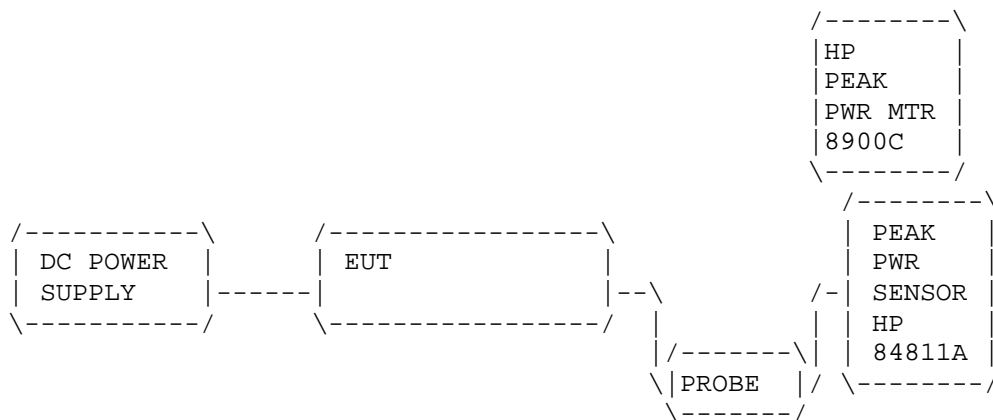
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# 15.247(b)(2): POWER OUTPUT

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.

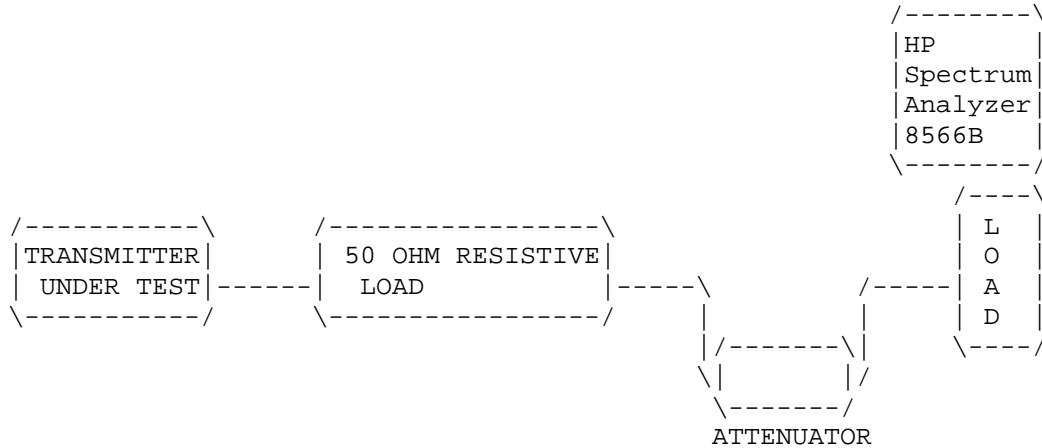
MEASUREMENT: 20 mWATTS



POWER OUPUT: 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.

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15.247(c) Method of Measuring RF Conducted Spurious Emissions



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

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

EMISSION FREQUENCY ____MHz____	dB BELOW CARRIER _____
906.00	0.0
1812.0	-52.5
2718.0 R	-45.2
915.00	0.0
1830.00	47.8
2745.00R	-49.5
924.60	0.0
1849.20	-47.8
2773.80R	-53.5

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	FIELD STRENGTH	S15.209	
of Fundamental:	of Harmonics	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:

EMISSION FREQ. MHz	METER READING @ 3m dBuV	COAX LOSS dB	ACF dB	FIELD STRENGTH dBuV/m	FCC LIMIT dBuV/m	MARGIN dB	ANT ANT.
903.00	73.90	2.90	24.19	100.99	127.38	26.39	V
1806.00	13.90	1.00	27.22	42.12	50.99	8.87	V
2709.00R	12.00	1.14	29.77	42.91	54.00	11.09	V
4515.00R	9.30	1.41	33.58	44.29	54.00	9.71	V
5418.00R	0.40	1.54	34.60	36.54	54.00	17.46	V
6321.00	4.30	1.68	35.61	41.59	50.99	9.40	V
906.40	76.30	2.90	24.17	103.37	127.38	24.01	H
1809.80	19.80	1.00	27.24	48.04	54.00	5.96	V
2725.50R	12.10	1.14	29.81	43.05	54.00	10.95	H
3635.00R	-0.50	1.28	32.09	32.86	54.00	21.91	H
4541.00R	10.10	1.41	33.61	45.12	54.00	8.88	V
5444.00R	6.10	1.55	34.62	42.27	54.00	11.73	H
6350.00	0.30	1.68	35.64	37.63	54.00	16.37	V
909.00	73.30	2.90	24.16	100.36	127.38	27.02	V
1818.00	13.50	1.00	27.27	41.77	50.38	8.61	V
2727.00R	10.50	1.14	29.82	41.46	54.00	12.54	H
4545.00R	6.50	1.41	33.61	41.53	54.00	12.47	V
5454.00R	5.40	1.55	34.64	41.58	54.00	12.42	V
6363.00	0.70	1.69	35.66	38.04	54.00	15.96	V

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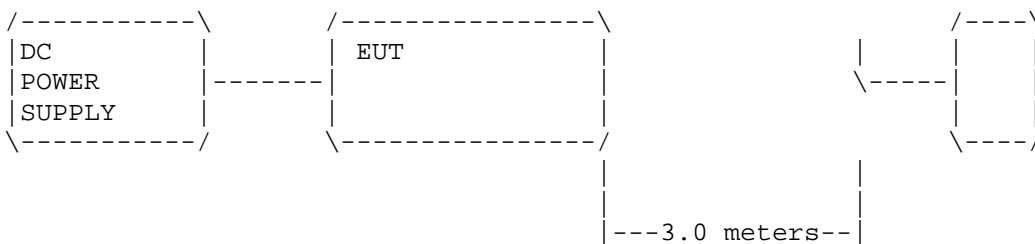


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NAME OF TEST: RADIATION INTERFERENCE CONTINUED  
RULES PART NUMBER: 15.247, 15.209  
TEST PROCEDURE: ANSI STANDARD C63.4-1992 as described on previous page.

2.993(a)(b) Continued Field strength of spurious emissions:

#### Method of Measuring Radiated Spurious Emissions

Hewlett Packard  
Spectrum  
Analyzer  
HP8566B



Tuned, Calibrated  
Antenna which may  
be raised from 1-4  
meters above ground  
and changed  
in polarization

Equipment placed 80 cm above ground  
on a rotatable platform.

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