

APPLICANT: RF DATA CORP.

FCC ID: OFMRFD-8-ISM

#### TABLE OF CONTENTS

TEST REPORT CONTAINING:

PAGE 1.....TEST PROCEDURE  
PAGE 2.....TEST PROCEDURE & EQUIPMENT LIST AND:  
.....STATEMENT ABOUT ANTENNA  
.....PRODUCT DESCRIPTION  
PAGE 3.....CARRIER SEPERATION & NUMBER OF CHANNELS AND  
.....DWELL TIME INFORMATION & BW & POWER OUTPUT  
PAGE 4.....RADIATION INTERFERENCE TEST DATA  
PAGE 5.....METHOD OF MEASURING RADIATED SPURIOUS EMISS.  
PAGE 6.....RF CONDUCTED EMISSIONS

EXHIBIT ATTACHMENTS:

EXHIBIT 1.....POWER OF ATTORNEY LETTER  
EXHIBIT 2.....FCC ID LABEL SAMPLE  
EXHIBIT 3.....SKETCH OF FCC ID LABEL LOCATION  
EXHIBIT 4.....FRONT VIEW EXTERNAL PHOTO - WITHOUT CASE  
EXHIBIT 5.....REAR VIEW EXTERNAL PHOTO - WITHOUT CASE  
EXHIBIT 6.....FRONT VIEW EXTERNAL PHOTO - WITH CASE  
EXHIBIT 7.....REAR VIEW EXTERNAL PHOTO - WITH CASE  
EXHIBIT 8.....COMPONENT SIDE INTERNAL PHOTO  
EXHIBIT 9.....COPPER SIDE INTERNAL PHOTO  
EXHIBIT 10.....BLOCK DIAGRAM  
EXHIBIT 11.....PARTS LIST  
EXHIBIT 12A.....SCHEMATIC - SECOND IF  
EXHIBIT 12B.....SCHEMATIC - CPU + GMSK  
EXHIBIT 12C.....SCHEMATIC - FRONT END  
EXHIBIT 12D.....SCHEMATIC - XMT  
EXHIBIT 12E.....SCHEMATIC - RS-232  
EXHIBIT 13A-13C.....INSTRUCTION MANUAL  
EXHIBIT 14.....TEST SET UP PHOTO  
EXHIBIT 15.....NUMBER OF CHANNELS PLOT  
EXHIBIT 16.....DWELL TIME PLOTS  
EXHIBIT 17.....CHANNEL SEPERATION PLOT

APPLICANT: RF DATA CORP.

FCC ID: OFMRFD-8-ISM

REPORT NO.: F:\CUS\R\RFDATA\RFD56U9.RPT

TABLE OF CONTENTS

## 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 SEPERATION & NUMBER OF CHANNELS: A near field probe was used to sence 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 placed in the memory mode. A plot was then made of the display showing the number of channels, 64 and the seperation of the channels, &chsep&.

15.247(a)(1)(i) CARRIER FREQUENCY DWELL TIME: A near field probe was used to sence 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. The 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 0.4Seconds.

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 > or = RBW and 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 pre-selector. 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 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the UUT was 72o F with a humidity of 76.2%. 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 78Deg F with a humidity of 65%.

APPLICANT: RF DATA CORP.  
FCC ID: OFMRFID-8-ISM  
REPORT #: F:\CUS\R\RFDATA\RFD56U9.RPT  
PAGE #: 1

## 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: Hewlett Packard 8566B - Opt 462, w/ preselector 85685A, & Quasi-Peak Adapter HP 85650A, & HP 8449B - OPT H02 Cal. 6/26/98
2. Signal Generator, Hewlett Packard 8640B, cal. 10/1/98
3. Eaton Biconical Antenna Model 94455-1  
20-200 MHz Serial No. 0997 Cal. 5/15/98
4. Electro-Metric Dipole Kit, 20-1000 MHz, Model TDA-30 10/15/98
5. Electro-Metric Horn 1-18 GHz, Model RGA-180, Cal. 8/15/98
6. Electro-Metric Antennas Model TDA-30/1-4, Cal. 10/15/98
7. Electro-Metric Line Impedance Stabilization Network Model No. EM-7821, Serial No. 101; 100KHz-30MHz 50uH. Cal. 11/19/98
8. Electro-Metric Line Impedance Stabilization Network Model No. EM-7820, Serial No. 2682; 10KHz-30MHz 50uH. Cal. 11/19/98
9. Special low loss cable was used above 1 GHz
10. Tenney Temperature Chamber

## INTRODUCTION: GENERAL INFORMATION AND DATA

ANTENNA: The OFMRFD-8-ISM incorporates a permanent antenna having less than 1 dBi gain. The antenna is permanently epoxied in place.

PRODUCT DESCRIPTION The OFMRFD-8-ISM is a frequency hopping radio modem which consists of several separate blocks. The controller is responsible for all interfacing and receives and responds to all incoming events. The controller executes a multitasking kernel which resides in internal FLASH memory and which can be up graded in-circuit using the auxiliary SPI bus interface connection. The controller powers up and down the receiver section, transmitter, the time base and power management. The power management is to reduce the power. This unit is a low power FREQUENCY HOPPING data acquisition transmitter operating in the 902-928 MHz band.

15.247(a)(1) CARRIER FREQUENCY SEPARATION & NUMBER OF CHANNELS: The number of channels was 64 and the channel separation was 230KHz for a total bandwidth of 15.13MHz. The following plot shows the total number of frequencies.

15.247(a)(1)(i) The plot in EXHIBIT 16 shows that the dwell time on any frequency is less than 0.165 Seconds.

NAME OF TEST: 6.0dB BANDWIDTH

RULES PART NUMBER: 15.247(a)(2)

REQUIREMENTS: The 6.0dB bandwidth must be greater than 500KHz.

MEASUREMENT: The 6.0dB bandwidth measured 15.13MHz MHz.

MEASUREMENT DATA: See plot on the EXHIBIT 12.

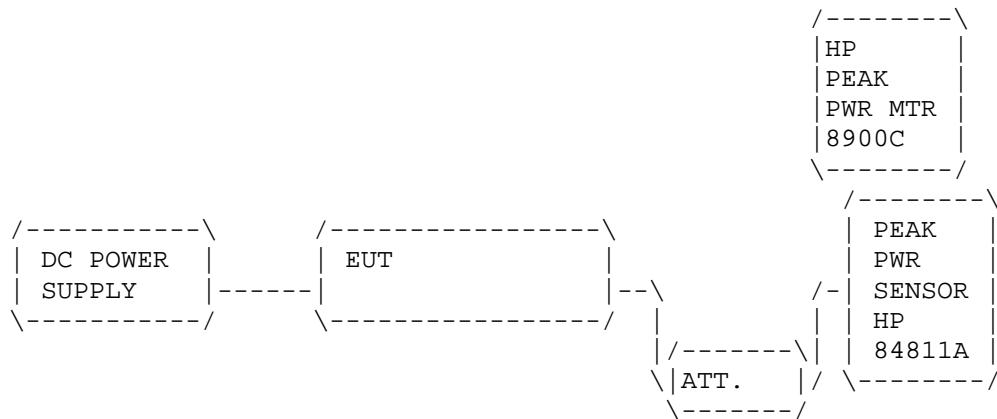
NAME OF TEST: POWER OUTPUT

RULES PART NUMBER: 15.247(b)

MEASUREMENT: 40 mWATTS

15.247(c) Method of Measuring RF Power output:

The Peak power Sensor was connected in place of the antenna. Each configuration was tested with the coax cable length as described.



APPLICANT: RF DATA CORP.

FCCID: OFMRFID-8-ISM

REPORT #: F:\CUS\R\RFDATA\RFD56U9.RPT

PAGE #: 3

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NUMBER: 15.249, 15.209

REQUIREMENTS:

FIELD STRENGTH of Fundamental:	FIELD STRENGTH of Harmonics	S15.209
902-928MHz	30 - 88 MHz	40 dBuV/m @3M
127.38dBuV/m @3m	88 -216 MHz	43.5
	216 -960 MHz	46
	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	FIELD STRNGTH dBuV/m	MARGIN dB	ANT.
907.18	83.80	2.90	24.17	110.87	V
1814.30	16.10	1.00	27.26	44.36	H
2721.50R	20.50	1.14	29.80	51.44	H
3628.70R	7.00	1.27	32.07	40.35	V
4535.90R	4.40	1.41	33.60	39.41	V
5443.00R	-3.30	1.55	34.62	32.87	H
6350.20	-2.10	1.68	35.64	35.23	V
914.16	83.20	2.90	24.14	110.24	V
1828.32	14.80	1.00	27.31	43.11	V
2742.48R	9.20	1.14	29.86	40.20	H
3656.64R	6.80	1.28	32.14	40.22	H
4570.80R	2.10	1.42	33.64	37.16	H
6399.12	1.50	1.69	35.70	38.89	H
8227.44R	2.50	1.97	37.64	42.11	H
922.32	82.70	2.90	24.11	109.71	V
1844.60	15.20	1.01	27.38	43.59	H
2766.90R	18.30	1.15	29.92	49.36	H
3689.28R	15.00	1.28	32.22	48.51	H
4611.60R	7.40	1.42	33.69	42.51	H
5533.90	6.00	1.56	34.73	42.29	H
7378.50R	-0.90	1.84	36.80	37.74	V

A SEARCH WAS MADE AT ALL OF THE HARMONICS UP TO THE 10th HARMONIC OF THE FUNDAMENTAL FREQUENCY.

APPLICANT: RF DATA CORP.  
FCC ID: OFMRFD-8-ISM  
REPORT #: F:\CUS\R\RFDATA\RFD56U9.RPT  
PAGE #: 4

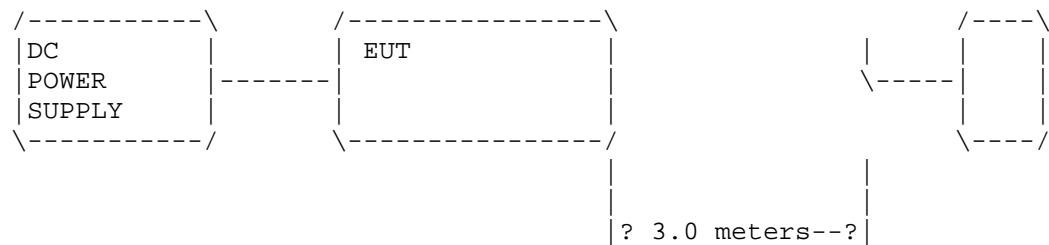
APPLICANT: RF DATA CORP.  
FCC ID: OFMRFD-8-ISM  
NAME OF TEST: RADIATION INTERFERENCE  
RULES PART NUMBER: 15.247, 15.209

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

2.993(a)(b)  
2.993(a)(b) Continued Field\_strength\_of\_spurious\_emissions:

Method of Measuring Radiated Spurious Emissions

Hewlett Packard  
Spectrum  
Analyzer  
HP8566A

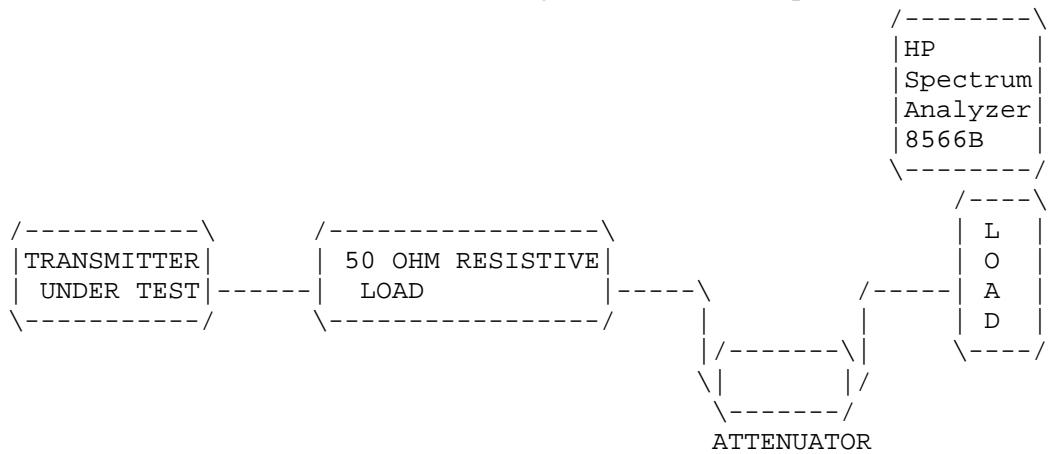


Tuned, Calibrated  
Antenna which may  
be raised from 4  
to 20' above ground  
and changed  
in polarization

Equipment placed 4' above ground  
on a rotatable platform.

APPLICANT: RF DATA CORP.  
FCCID: OFMRFD-8-ISM  
REPORT #: F:\CUS\R\RFDATA\RFD56U9.RPT  
PAGE #: 5

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
907.18	0.0
1814.36	-34.6
2721.50R	-90.9
3628.79R	-85.0
5443.12R	-93.7
7257.48	-91.2
914.16	0.0
1828.32	-67.5
2742.48R	-66.4
3656.64	-89.5
4570.80R	-82.5
5484.96	-94.1
6399.12	-87.4
922.33	0.0
1844.61	-30.0
2767.94R	-55.4
3689.27R	-50.6
4611.57R	-69.0
5533.90	-68.3
6456.16	-67.5
7378.45	-64.9

NOTE: THE SPECTRUM WAS SCANNED TO THE TENTH HARMONIC.

APPLICANT: RF DATA CORP.

FCCID: OFMRFID-8-ISM

REPORT #: F:\CUS\R\RFDATA\RFD56U9.RPT

PAGE #: 6