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ENGINEERING TEST REPORT
FOR
APLLICATION of
GRANT of CERTIFICATION

FOR

CFR 47, PART 15C - INTENTIONAL RADIATORS
Paragraph 15.247 Modular Transmitter

For

INTERMEC TECHNOLOGIES CORPORATION
550 2nd Street SE
Cedar Rapids, IA 52401
Jerry Johnson

PENN READER
Model: ITRM91501X04
Frequency 902-928 MHz
FCC ID#: EHA-RM91501X04

Test Date:February 7, 2002

Certification Date: February 7, 2002

Certifying Engineer: Scot D Rogers
Scot D. Rogers
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FORWARD:

The following is submitted for consideration in obtaining a Grant of Certification for Frequency hopping spread spectrum intentional radiators per CFR Paragraph 15.247.

Name of Applicant:

INTERMEC TECHNOLOGIES CORPORATION
550 2nd Street SE
Cedar Rapids, IA 52401

Model: ITRM91501X04 PENN READER.

FCC I.D.: EHA-RM91501X04.

Frequency Range: 902-928 MHz.

Operating Power: one-Watt (antenna-conducted measurement).

1) Applicable Standards & Test Procedures

a) In accordance with the Federal Communications Code of Federal Regulations, dated October 1, 2000, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, and applicable parts of paragraph 15, Part 15C Paragraph 15.247 the following is submitted:

b) Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI 63.4-1992 Document and FCC document DA 00-705.

2.1033(b) Application for Certification

(1) Manufacturer: INTERMEC TECHNOLOGIES CORPORATION
550 2nd Street SE
Cedar Rapids, IA 52401

(2) Identification: Model: ITRM91501X04
FCC I.D.: EHA-RM91501X04

(3) Instruction Book: Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions: Refer to Exhibit of Operational Description.

(5) Block Diagram with Frequencies: Refer to Exhibit of Operational Description.

(6) Report of Measurements: Follows in this Report.

(7) Photographs: Construction, Component Placement, etc.: Refer to Appendix of this report for photographs of equipment.

(8) Peripheral Equipment used for testing.
The EUT has provision to interface with a computer, which uses the RS232 communications protocol. The support equipment used for testing was a Dell laptop computer and a Hewlett Packard printer. The communications cable was attached to the EUT as directed by the manufacturer and utilized the RS232 serial communication port of the computer.

(9) Transition Provisions of 15.37 are not being requested.

(10) Frequency hopping Spread Spectrum transmitters:

Compliance with 15.247(a)(1) and the receiver bandwidth requirement are demonstrated in this report and exhibits.

(11) Not Applicable. The EUT is not a Scanning Receiver.

(12) Not Applicable. The EUT does not operate in the 59-64 GHz frequency band.

2) Equipment Tested

Equipment	Model	FCC I.D.#
EUT	ITRM91501X04	EHA-RM91501X04
CPU	Dell PP01X	DoC
Printer	2168A	B94C2121X

Test results in this report relate only to the items tested.

3) Equipment Function and Testing Procedures

The EUT is a transmitter module, radio frequency tag reader, used for radio frequency tag identification. The units are typically mounted inside of an enclosure with the supplied antenna mounted as required by the end user. The unit is designed to interface to a computer utilizing the RS232 communications protocol. A laptop computer was used to communicate with the EUT over the RS232 cable. A printer was also connected to the laptop through a standard parallel printer cable. The unit typically operates from a direct current voltage source supplied at the system level. For testing purposes, an eight-volt power supply was used to power the unit. The device is marketed for use with one of two antenna configurations. The antenna options include a circularly polarized pan and a directional wedge. Both of which were tested for this report.

4) Equipment and Cable Configurations

Conducted Emission Test Procedure

The unit typically operates only from eight-volt supply voltage from the host device. For testing purposes, an eight-volt power supply was used to power the unit. Therefore, the power supply of the laptop computer, which was interfaced with the EUT, was tested for conducted emissions. The test setup, including the EUT, was arranged in a typical equipment configuration and placed on a 1 x 1.5-meter wooden bench, 0.8 meters high located in a screen room. The power lines of the system were isolated from the power source using a standard LISN with a 50 µHy choke. EMI was coupled to the spectrum analyzer through a 0.1 µF capacitor internal to the LISN. The LISN was positioned on the floor beneath the wooden bench supporting the EUT. The power lines and cables were draped over the back edge of the table.

Radiated Emission Test Procedure:

The EUT was placed on a rotatable 1 x 1.5 meter wooden platform, 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before data was

taken using a spectrum analyzer. Refer to photographs in Appendix for EUT placement.

5) List of Test Equipment

A Hewlett Packard 8591EM Spectrum Analyzer was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device fortesting the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table. Refer to the appendix for a complete list of Test Equipment.

HP 8591 EM ANALYZER SETTINGS		
CONDUCTED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
9 kHz	30 kHz	Peak / Quasi Peak
RADIATED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
120 kHz	300 kHz	Peak / Quasi Peak
HP 8562A ANALYZER SETTINGS		
RBW	VIDEO BW	DETECTOR FUNCTION
100 kHz	100 kHz	PEAK
1 MHz	1 MHz	Peak / Average

EQUIPMENT	MFG.	MODEL	CAL. DATES	DUE.
LISN	Comp. Design	1762	10/01	10/02
Antenna	ARA	BCD-235-B	10/01	10/02
Antenna	EMCO	3147	10/01	10/02
Antenna	EMCO	3143	4/01	4/02
Analyzer	HP	8591EM	7/01	7/02

6) Units of Measurements

Conducted EMI: Data is in dBµV; dB referenced to one microvolt.

Radiated EMI: Data is in dBµV/m; dB/m referenced to one microvolt per meter.

7) Test Site Locations

Conducted EMI: The AC powerline conducted emissions tests were performed in a shielded screenroom located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.

Radiated EMI: The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.

Site Approval: Refer to Appendix for FCC Site Approval Letter, Reference # 90910.

8) SUBPART B – UNINTENTIONAL RADIATORS

Conducted EMI

The EUT was arranged in a typical equipment configuration and placed on a 1 x 1.5-meter wooden bench 80 cm above the conducting ground plane, floor of a screen room. The bench was positioned 40 cm away from the wall of the screen room. The LISN was positioned on the floor of the screen room 80cm from the rear of the EUT. The manufacturer supplied AC power wall adapter for the laptop computer was connected to the

LISN. A second LISN was positioned on the floor of the screen room 80-cm from the rear of the supporting equipment of the EUT. All power cords except thelaptop computer were then powered from the second LISN. EMI was coupled to the spectrum analyzer through a 0.1 µF capacitor, internal to the LISN. Power line conducted emissions testing was carried out individually for each current carrying conductor of the laptop computer. The excess length of lead between the system and the LISN receptacle was folded back and forth to form a bundle not exceeding 40 cm in length. The screen room, conducting ground plane, analyzer, and LISN were bonded together to the protective earth ground. Preliminary testing was performed to identify the frequency of each radio frequency emission displaying the highest amplitude. The cables were repositioned to obtain maximum amplitude of measured EMI level. Once the worst-case configuration was identified, plots were made of the EMI from 0.15 MHz to 30 MHz then the data was recorded with maximum conducted emissions levels. Refer to figures one and two for plots of the conducted emissions.

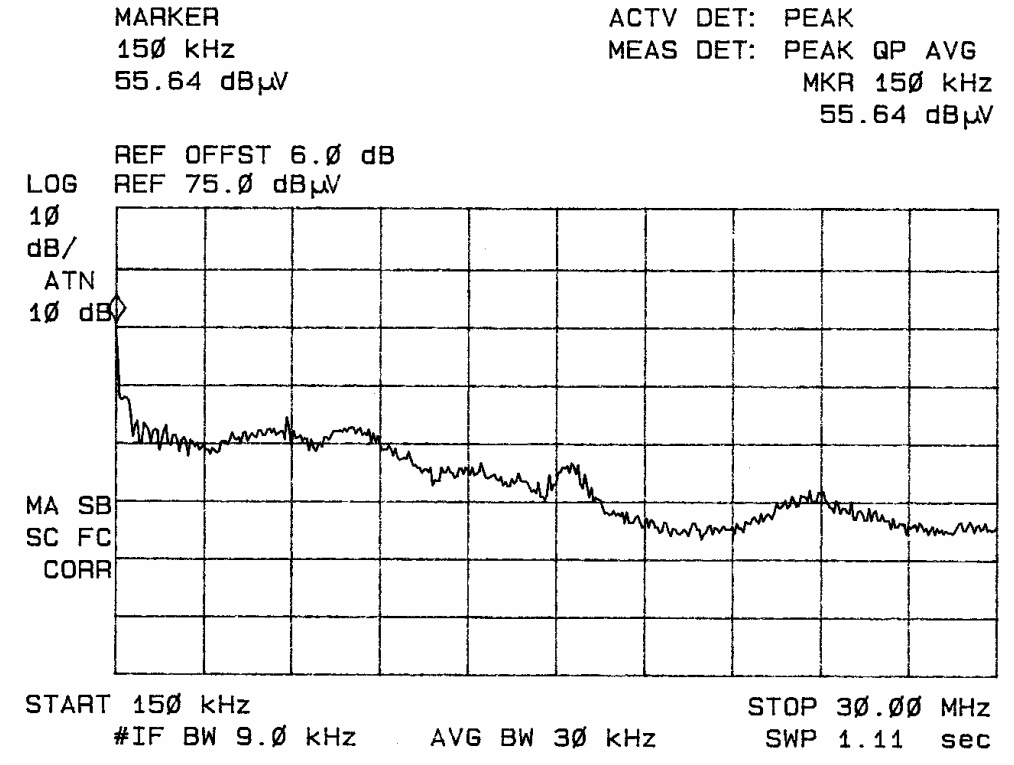

Figure 1. Conducted Emissions Line 1.

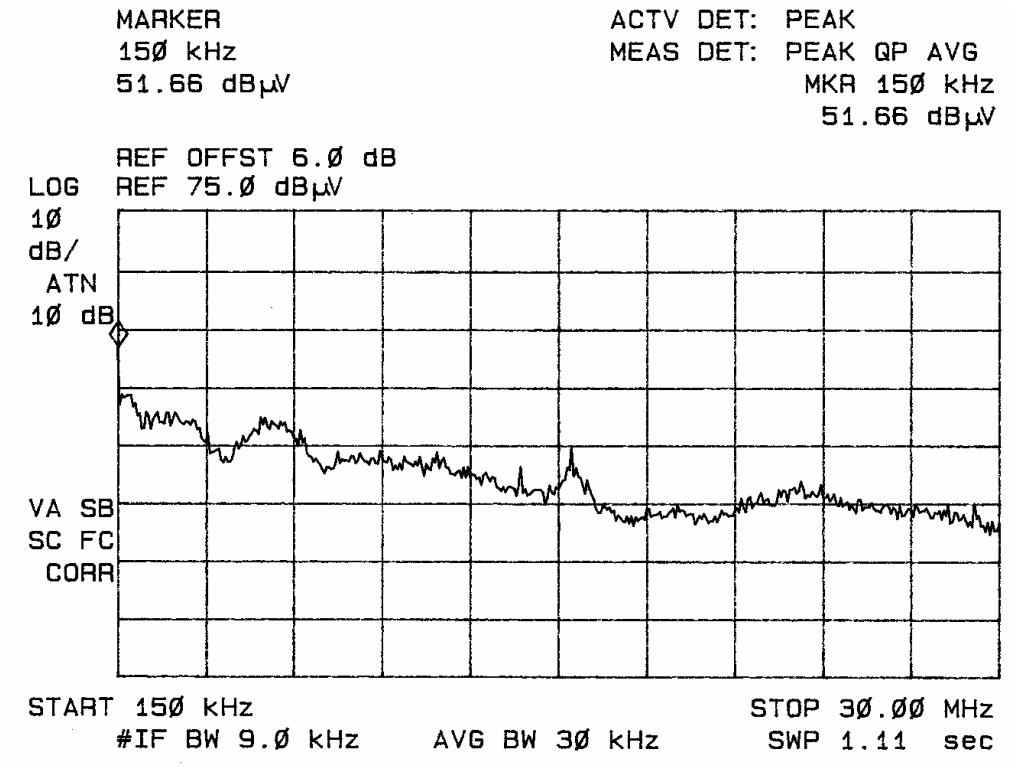

Figure 2. Conducted Emissions Line 2.

Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Plots were made of the frequency spectrum from 30 MHz to 10,000 MHz for the preliminary testing. Refer to figures three and four for plots of the radiated emissions spectrum taken in a screen roomand figures five and six for antenna conducted emissions of the EUT. The highest radiated emission was then re-maximized at this location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the OATS to a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna position between horizontal and vertical polarization. Antennas used were Broadband Biconical from 30 to 200 MHz, Biconilog from 30 to 1000 MHz, Log Periodic from 200 MHz to 5 GHz and or, pyramidal horns and mixers from 4 GHz to 10 GHz, notch filters and appropriate amplifierswere utilized.

Sample Calculations:

RFS = Radiated Field Strength

dBµV/m @ 3m = dBµV + A.F.- Amplifier Gain

dBµV/m @ 3m = 44.3 + 7.5 - 35

= 16.8

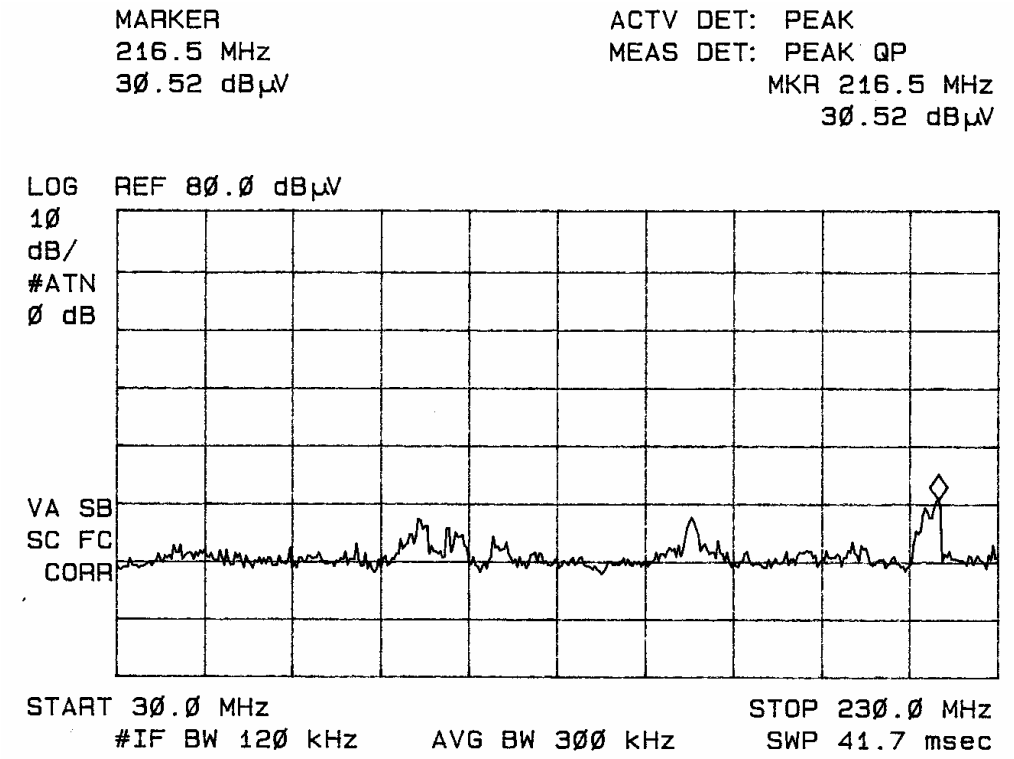

Figure 3. Radiated Emissions taken at 1 meter in screen room.

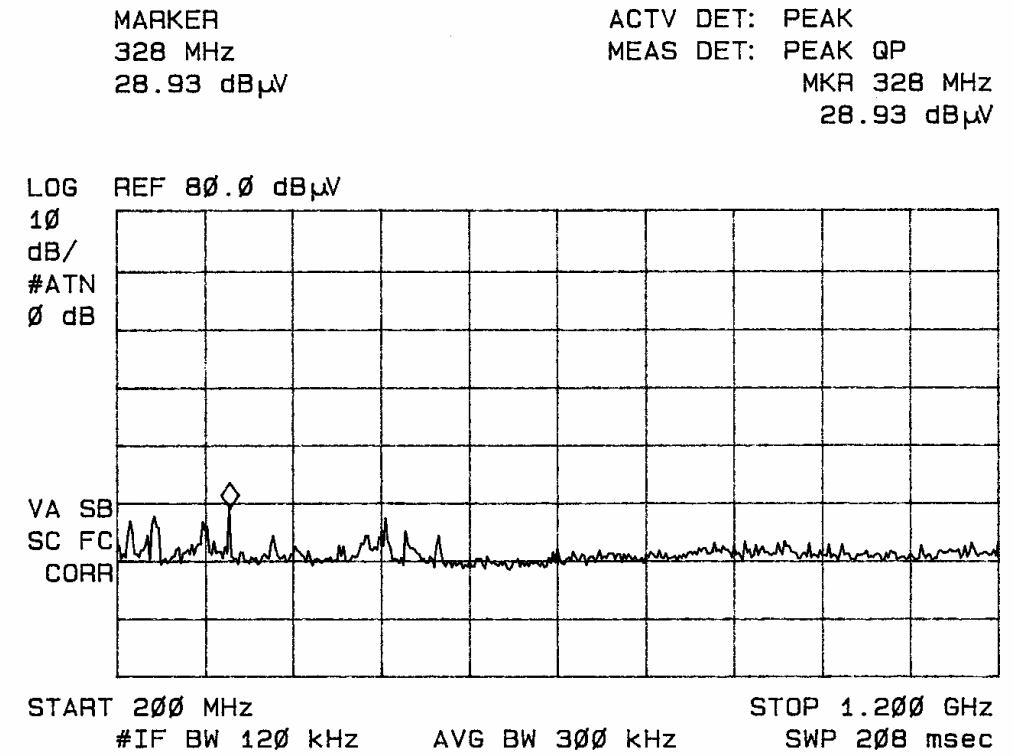

Figure 4. Radiated Emissions taken at 1 meter in screen room.

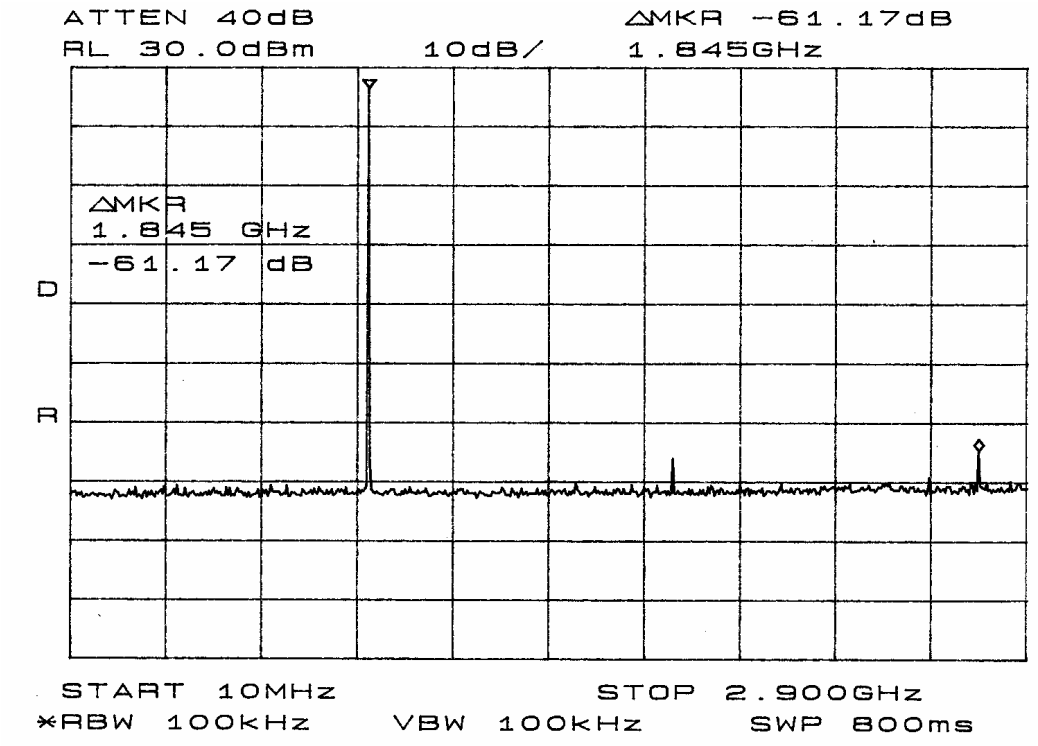

Figure 5. Antenna Conducted Emissions taken in the screen room.

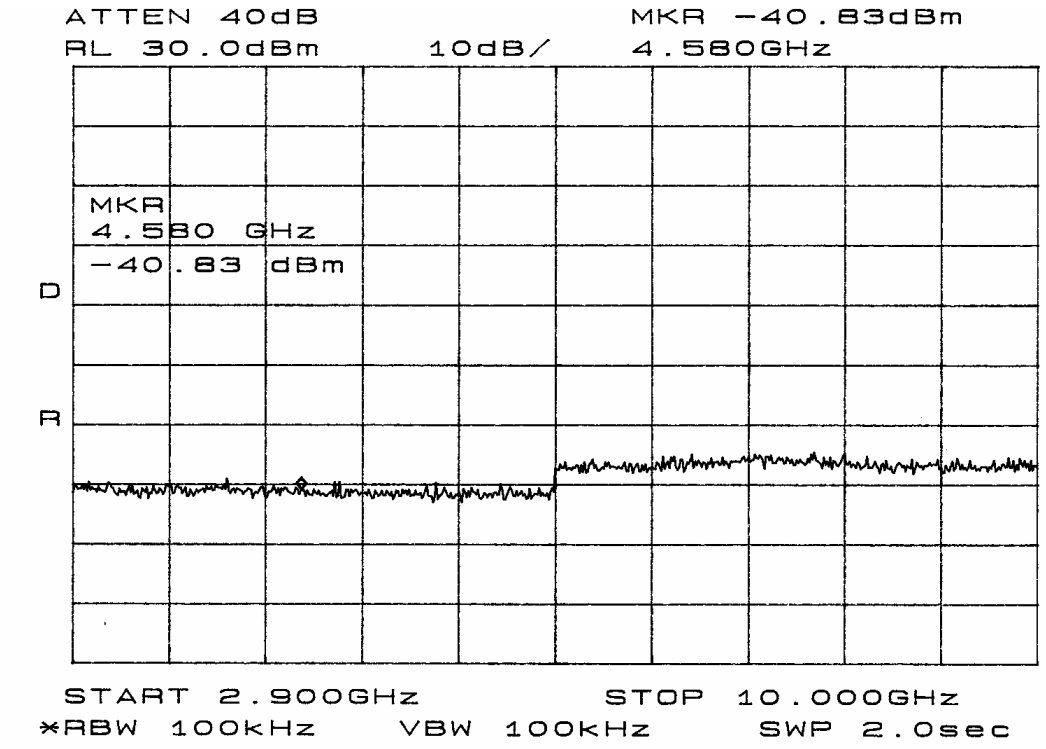

Figure 6. Antenna Conducted Emissions taken in the screen room.

Data: Conducted Emissions (7 Highest Emissions)

Frequency band (MHz)	L1 Level (dBµV) Peak	Q.P.	AVE	L2 Level (dBµV) Peak	Q.P.	AVE	CISPR 22 Limit Q.P. Ave(dBµV)
0.15 - 0.5	55.6	46.1	34.7	51.6	46.4	37.6	66 56
0.5 – 5	44.8	40.3	35.7	44.2	41.3	37.2	56 46
5 – 10	37.5	32.8	27.2	39.9	36.2	30.3	60 50
10 – 15	30.4	26.2	19.8	32.7	27.5	20.9	60 50
15 – 20	33.3	26.0	19.6	31.0	26.7	19.9	60 50
20 – 25	27.1	23.1	17.2	28.2	24.3	18.3	60 50
25 - 30	24.7	20.7	14.5	25.2	20.5	14.3	60 50

Other emissions present had amplitudes at least 10 dB below the limit

Data: General Radiated Emissions from EUT (6 Highest Emissions)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
98.4	44.3	39.9	7.5	35	16.8	12.4	43.5
116.4	40.4	46.7	6.9	35	12.3	18.6	43.5
215.0	42.2	40.2	11.3	35	18.5	16.5	43.5
216.0	43.0	41.7	11.3	35	19.3	18.0	43.5
240.2	46.9	42.0	11.9	35	23.8	18.9	46.0
525.0	35.9	45.9	18.8	35	19.7	29.7	46.0

Other emissions present had amplitudes at least 10 dB below the limit.

Data: General Radiated Emissions from Support Equipment (6 Highest Emissions)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
100.3	44.7	48.5	6.6	35	16.3	20.1	43.5
105.0	46.3	39.1	6.4	35	17.7	10.5	43.5
157.6	31.9	43.1	9.3	35	6.2	17.4	43.5
199.8	34.5	39.8	9.9	35	9.4	14.7	43.5
213.8	32.0	38.2	10.4	35	7.4	13.6	43.5
700.0	28.3	30.9	20.3	35	13.6	16.2	46.0

Other emissions present had amplitudes at least 10 dB below the limit.

Summary of Results for Conducted Emissions

The conducted emissions for the EUT meetthe requirements for CISPR 22 and FCC Part 15B CLASS B Digital Devices. The EUT had a 15.7 dB minimum margin belowthe quasi-peak limit. Other emissions were present withthe recorded data representing the worst-case amplitudes.

Summary of Results for Radiated Emissions

The radiated emissions for the EUT meet the requirements for CISPR 22 and FCC Part 15B CLASS B Digital Devices. The EUT had a 16.3 dB minimum margin below the limit. Other emissions were present with amplitudes at least 10 dB below the limit.

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the CISPR 22 or FCC Part 15B CLASS B emissions standards. There were no deviations to the specifications.

9) Subpart C - Intentional Radiators

As per CFR Part 15, Subpart C, paragraph 15.247 the following information is submitted.

15.203 Antenna Requirements

The unit is produced with a reverse SMA antenna connector to be used with the approved authorized antennas. The requirements of 15.203 are met; there are no deviations or exceptions to the specification.

15.205 Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were checked at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. No other

significant emission was observed which fell into the restricted bands of operation.

Sample Calculations:

RFS (dBµV/m @ 3m) = FSM(dBµV) + A.F.(dB)- Gain(dB)
= 40.4 + 6.9 - 35
= 12.3

Data: Emissions in Restricted Bands

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
116.4	40.4	46.7	6.9	35	12.3	18.6	43.5
161.0	38.0	39.4	8.9	35	11.9	13.3	43.5
240.2	46.9	42.0	11.9	35	23.8	18.9	46.0
324.0	32.8	39.0	14.7	35	12.5	18.7	46.0
2709.0	30.1	32.5	32.5	25	37.6	40.0	54.0
2709.0	30.7	37.5	32.5	25	38.2	45.0	54.0
2745.0	35.0	30.0	32.5	25	42.5	37.5	54.0
2745.0	30.3	35.5	32.5	25	37.8	43.0	54.0
2781.0	31.0	31.7	32.5	25	38.5	39.2	54.0
2781.0	30.0	37.0	32.5	25	37.5	44.5	54.0
3612.0	28.5	27.6	38.6	25	42.1	41.2	54.0
3612.0	30.3	29.0	38.6	25	43.9	42.6	54.0
3660.0	30.0	30.1	38.6	25	43.6	43.7	54.0
3660.0	29.6	29.8	38.6	25	43.2	43.4	54.0
3708.0	29.0	30.0	38.6	25	42.6	43.6	54.0
3708.0	27.3	32.0	38.6	25	40.9	45.6	54.0
4515.0	28.0	29.0	40.6	25	43.6	44.6	54.0
4515.0	29.1	29.4	40.6	25	44.7	45.0	54.0
4575.0	29.5	29.6	40.6	25	45.1	45.2	54.0
4575.0	29.1	29.6	40.6	25	44.7	45.2	54.0
4635.0	28.0	29.1	40.6	25	43.6	44.7	54.0
4635.0	29.0	29.6	40.6	235	44.6	45.2	54.0

Summary of Results for Radiated Emissions in Restricted Bands:

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had an 8.4-dB minimum margin below the limits. No other emissions where found in the restricted frequency bands Other emissions were present with amplitudes at least 10 dB below the FCC Limits.

15.209 Radiated Emissions Limits; General Requirements

Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Emissions were checked in the screen room from 30 to 10,000 MHz and plots were made of the frequency spectrum from 30 MHz to 10,000 MHz for the preliminary testing. The highest radiated emission was then re-maximized at this location before final radiated emissions measurements were performed. Finaldata was taken with the EUT located at the open field test site at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying

the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Broadband Biconical from 30 MHz to 200 MHz, Biconilog from 30 MHz to 1000 MHz, Log Periodic from 200 MHz to 5 GHz, and/or Pyramidal Horns from 4 GHz to 10 GHz.

Sample Calculations:

RFS = Radiated Field Strength

dBµV/m @ 3m = dBµV + A.F.- Amplifier Gain

dBµV/m @ 3m = 44.3 + 7.5 - 35

= 16.8

Data: General Radiated Emissions from EUT (6 Highest Emissions)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
98.4	44.3	39.9	7.5	35	16.8	12.4	43.5
116.4	40.4	46.7	6.9	35	12.3	18.6	43.5
215.0	42.2	40.2	11.3	35	18.5	16.5	43.5
216.0	43.0	41.7	11.3	35	19.3	18.0	43.5
240.2	46.9	42.0	11.9	35	23.8	18.9	46.0
525.0	35.9	45.9	18.8	35	19.7	29.7	46.0

Other emissions present had amplitudes at least 10 dB below the limit.

Data: General Radiated Emissions from Support Equipment (6 Highest Emissions)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
100.3	44.7	48.5	6.6	35	16.3	20.1	43.5
105.0	46.3	39.1	6.4	35	17.7	10.5	43.5
157.6	31.9	43.1	9.3	35	6.2	17.4	43.5
199.8	34.5	39.8	9.9	35	9.4	14.7	43.5
213.8	32.0	38.2	10.4	35	7.4	13.6	43.5
700.0	28.3	30.9	20.3	35	13.6	16.2	46.0

Other emissions present had amplitudes at least 10 dB below the limit.

Summary of Results for Radiated Emissions:

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had a 16.3 dB minimum margin below the limits. Other emissions were present with amplitudes at least 10 dB below the FCC Limits.

15.247 Operation in the Band 902-928 MHz

The power output was measured on an open field test site at a three-meter distance. Data was taken per Paragraph 2.1046(a) and 15.247. The 902 and 928 MHz band edges are protected due to the 902.4 – 927.6 MHz channels used for frequency of operation.

(a) The EUT is a frequency hopping spread spectrum intentional radiator utilizing at least50 hopping channels. The 20-dB bandwidth of 213 kHz meets the requirements of less than 250 kHz wide with the average time of occupancy on

any frequency not greater than 0.4 seconds within a twenty second-time period.

(b) The maximum peak output power of the unit was measured at the antenna port and found to be 1 watt, which meets the requirement. The amplitudes of each emission and spurious emission were measured at a distance of 3 meters from the FSM antenna at the OATS. The amplitude of each emission was maximized by varying the FSM antenna height, polarization, and by rotating the turntable. A Biconilog Antenna was used for measuring emissions from 30 to 1000 MHz, Log Periodic Antenna for 200 to 5000 MHz, and Pyramidal Horn Antennas from 4 GHz to 10 GHz. Emissions were measured in dBµV/m at three-meters.

Sample calculation.

dBµv/m @ 3m = FSM + A.F. + cable loss
= 94.7 + 23.2
= 117.9

(c) The band edges are protected due to the frequency of operation of the EUT.

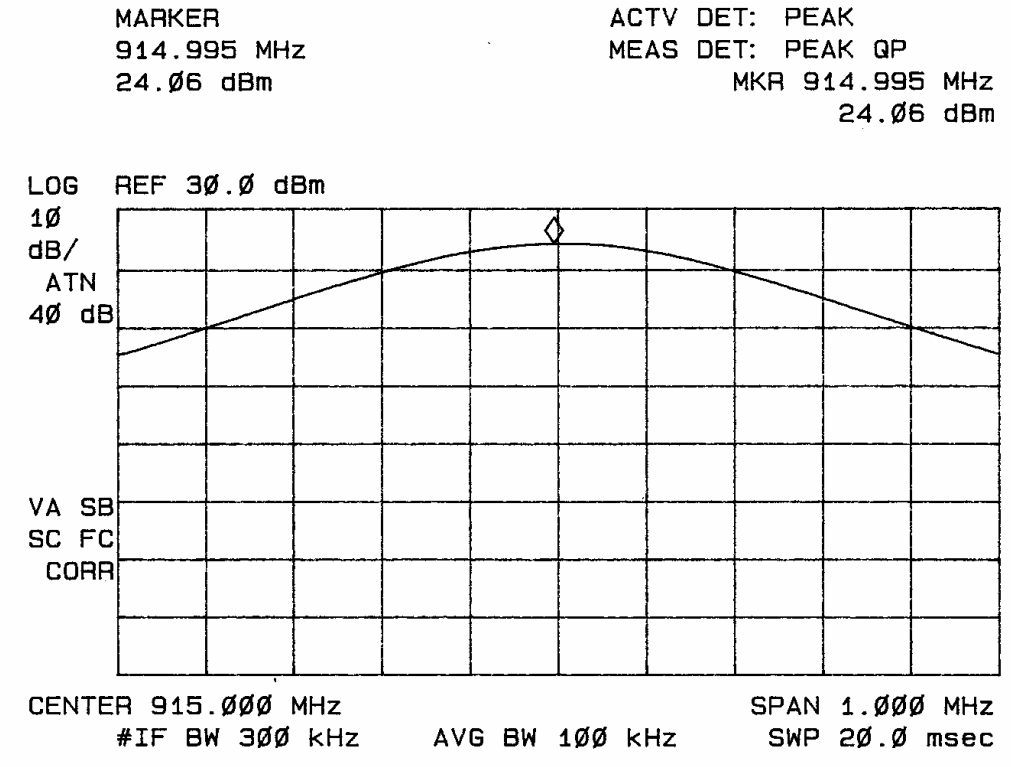

Figure 7. Maximum Power output.

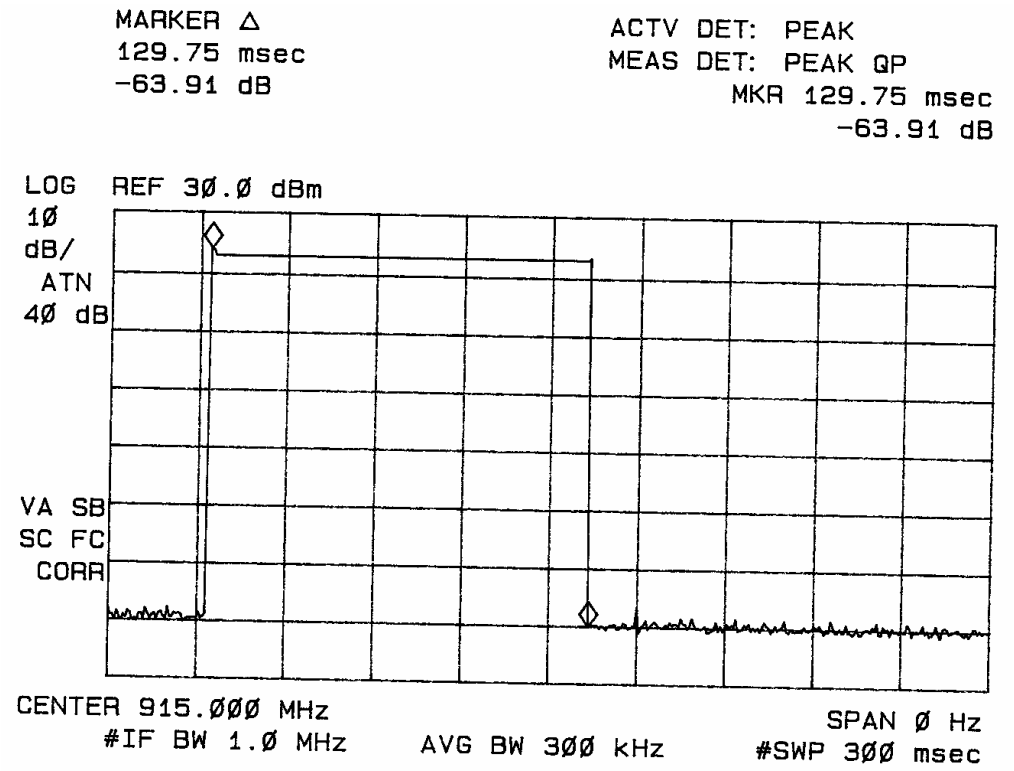

Figure 8. Dwell Time of Occupancy.

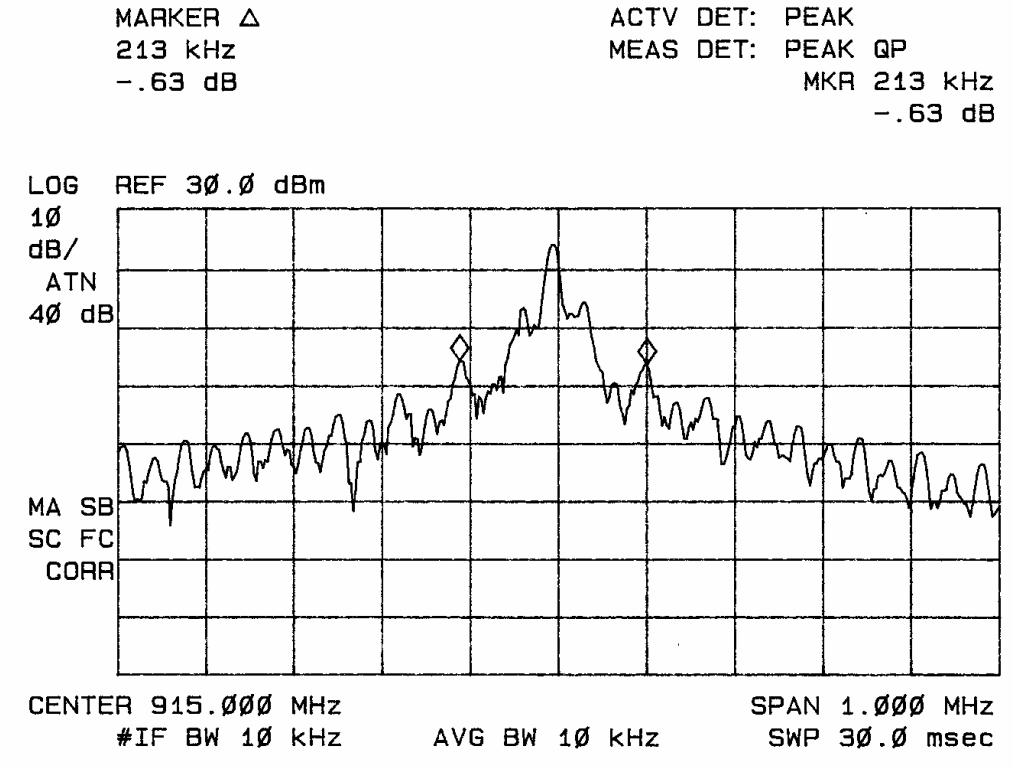

Figure 9. 20-dB bandwidth.

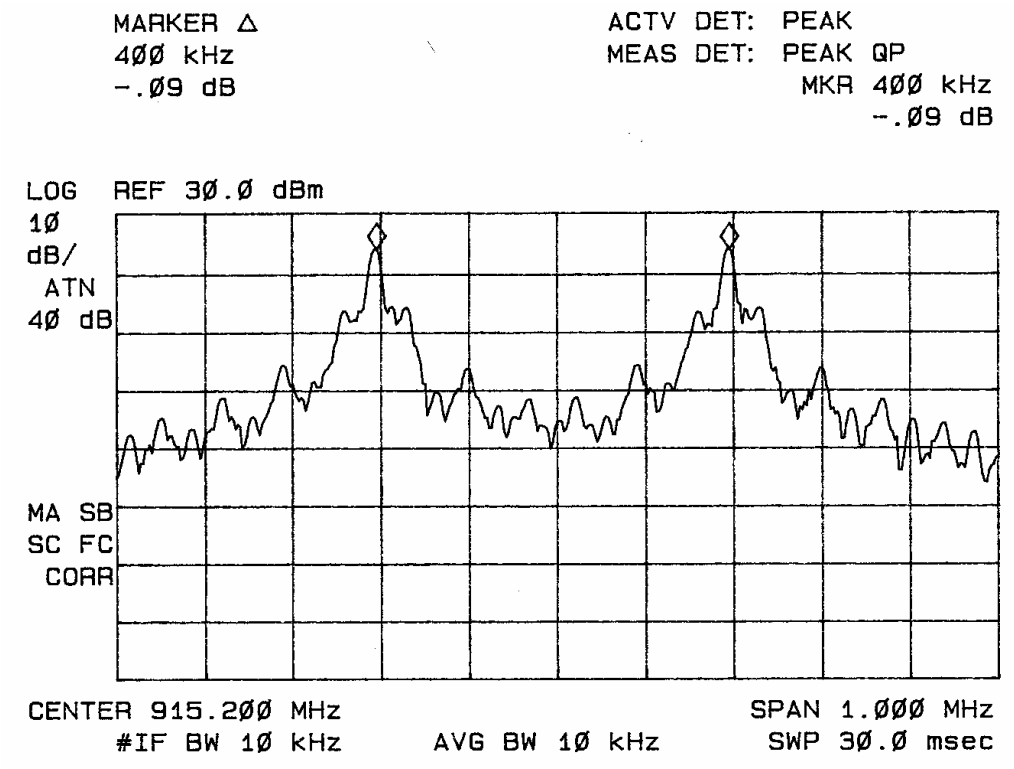

Figure 10. Channel Spacing.

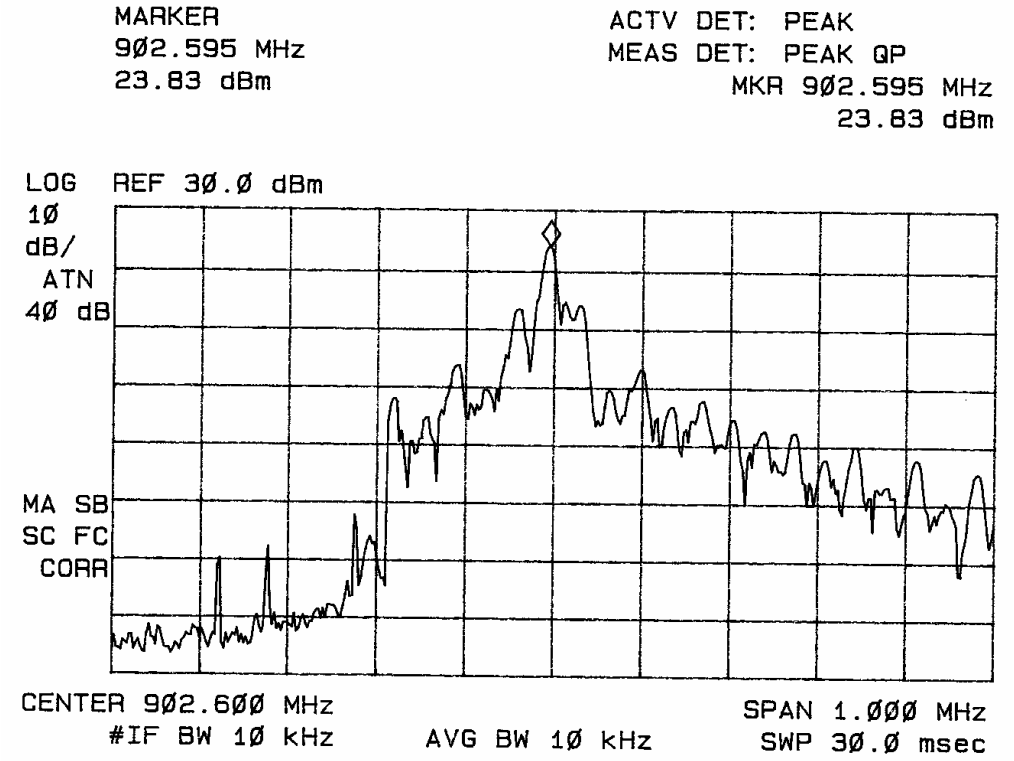

Figure 11. Band edge protection plot showing lowest channel.

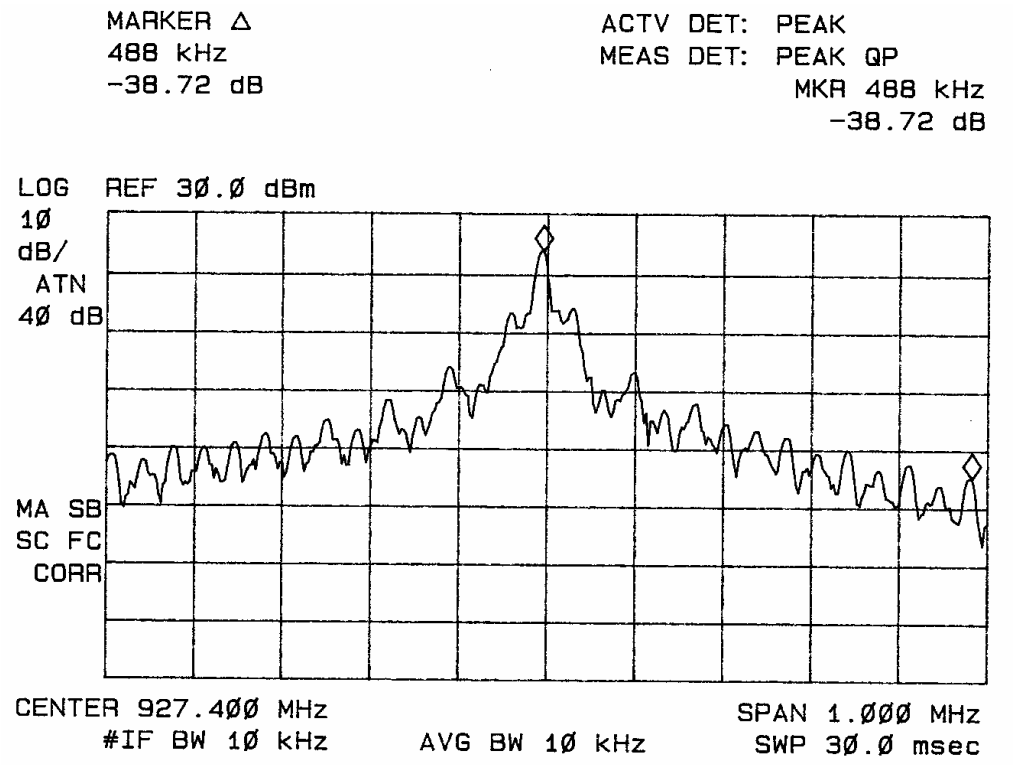

Figure 12. Band edge protection plot showing highest channel.

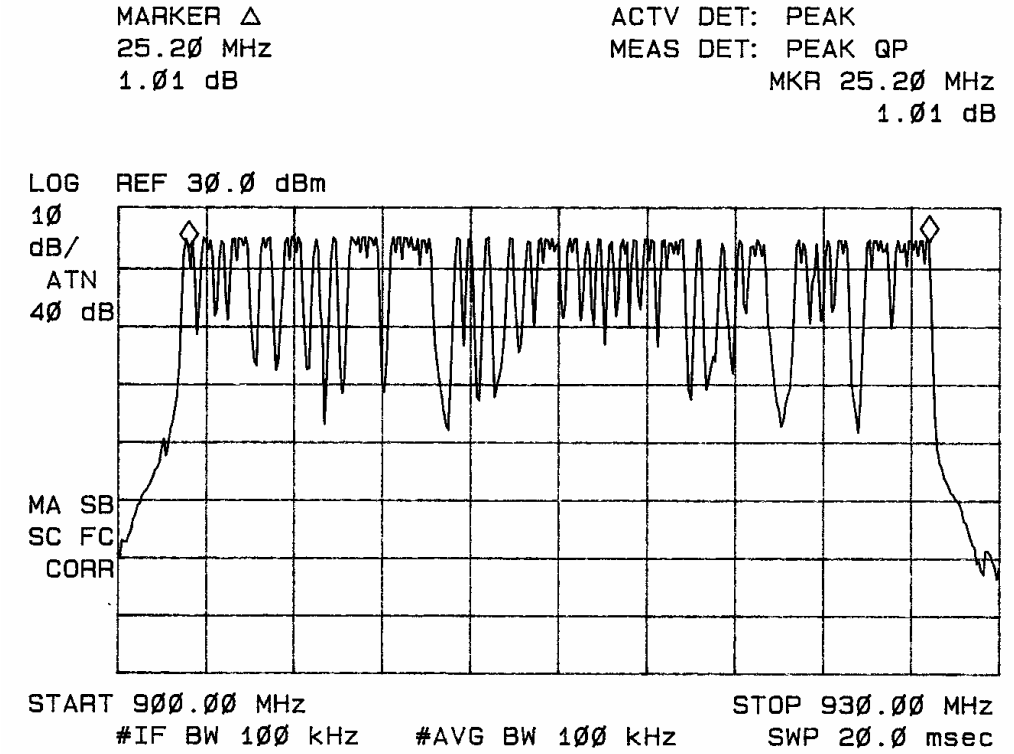

Figure 13. Full operational frequency band of 902-928 MHz.

Data: Radiated Emissions from EUT (Cushcraft Antenna)

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
903.000	94.7	105.0	23.2	0	117.9	128.2	125.2
1806.000	29.6	32.1	29.9	25	34.5	37.0	54.0
2709.000	30.1	32.5	32.5	25	37.6	40.0	54.0
3612.000	28.5	27.6	38.6	25	42.1	41.2	54.0
915.000	101.8	106.0	23.2	0	125.0	129.2	125.2
1830.000	30.1	30.5	29.9	25	35.0	35.4	54.0
2745.000	35.0	30.0	32.5	25	42.5	37.5	54.0
3660.000	30.0	30.1	38.6	25	43.6	43.7	54.0
4575.000	29.5	29.6	40.6	25	45.1	45.2	54.0
927.000	101.5	104.8	23.2	0	124.7	128.0	125.2
1854.000	30.3	31.0	29.9	25	35.2	35.9	54.0
2781.000	31.0	31.7	32.5	25	38.5	39.2	54.0
3708.000	29.0	30.0	38.6	25	42.6	43.6	54.0
4635.000	28.0	29.1	40.6	25	43.6	44.7	54.0

Data: Radiated Emissions from EUT (Sinclair Antenna)

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
903.000	95.6	105.3	23.2	0	118.8	128.5	125.2
1806.000	29.3	36.1	29.9	25	34.2	41.0	54.0
2709.000	30.7	37.5	32.5	25	38.2	45.0	54.0
3612.000	30.3	29.0	38.6	25	43.9	42.6	54.0
4515.000	29.1	29.4	40.6	25	44.7	45.0	54.0
915.000	95.5	105.2	23.2	0	118.7	128.4	125.2
1830.000	29.1	35.8	29.9	25	34.0	40.7	54.0
2745.000	30.3	35.5	32.5	25	37.8	43.0	54.0
3660.000	29.6	29.8	38.6	25	43.2	43.4	54.0
4575.000	29.1	29.6	40.6	25	44.7	45.2	54.0
927.000	95.3	104.8	23.2	0	118.5	128.0	125.2
1854.000	29.5	36.3	29.9	25	34.4	41.2	54.0
2781.000	30.0	37.0	32.5	25	37.5	44.5	54.0
3708.000	27.3	32.0	38.6	25	40.9	45.6	54.0
4635.000	29.0	29.6	40.6	25	44.6	45.2	54.0

Summary of Results for Radiated Emissions of Intentional Radiator

The EUT had a -4.0 dB margin below the limit at the fundamental frequency of operation and 8.8 dB margin below the limit for the harmonic emissions. The -4.0 dB margin is allowed by paragraph 15.247(b)(3), due to the less than 6 dBi gain antenna. The radiated emissions for the EUT meet the requirements for FCC Part 15.247 Intentional Radiators. There are no measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 10 dB below the FCC Limits. The specification of 15.247 are met, there are no deviations or exceptions to the requirements.

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the FCC Part 15C, paragraph 15.247, emissions standards. There were no modifications or deviations to the specifications.

APPENDIX

Model: ITRM91501X04 PENN READER

1. Test Equipment List
2. Rogers Qualifications
3. FCC Site Approval Letter

TEST EQUIPMENT LIST FOR ROGERS LABS, INC.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

List of Test Equipment:	Calibration Date:
Scope: Tektronix 2230	2/02
Wattmeter: Bird 43 with Load Bird 8085	2/02
Power Supplies: Sorensen SRL 2025, SRL 40-25, DCR 150, DCR 140	2/02
H/V Power Supply: Fluke Model: 408B (SN: 573)	2/02
R.F. Generator: HP 606A	2/02
R.F. Generator: HP 8614A	2/02
R.F. Generator: HP 8640B	2/02
Spectrum Analyzer: HP 8562A, Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W HP Adapters: 11518, 11519, 11520	4/01
Spectrum Analyzer: HP 8591 EM	7/01
Frequency Counter: Leader LDC 825	2/02
Antenna: EMCO Biconilog Model: 3143	4/01
Antenna: EMCO Log Periodic Model: 3147	10/01
Antenna: Antenna Research Biconical Model: BCD 235	7/01
Antenna: EMCO Dipole Set 3121C	2/02
Antenna: C.D. B-101	2/02
Antenna: Solar 9229-1 & 9230-1	2/02
Antenna: EMCO 6509	2/02
Audio Oscillator: H.P. 201CD	2/02
R.F. Power Amp 65W Model: 470A-1010	2/02
R.F. Power Amp 50W M185- 10-501	2/02
R.F. PreAmp CPPA-102	2/02
Shielded Room 5 M x 3 M x 30 M (101 dB Integrity)	
LISN 50 µHy/50 ohm/0.1 µf	10/01
LISN Compliance Eng. 240/20	2/02
Peavey Power Amp Model: IPS 801	2/02
Power Amp A.R. Model: 10W 1010M7	2/02
Power Amp EIN Model: A301	2/02
ELGAR Model: 1751	2/02
ELGAR Model: TG 704A-3D	2/02
ESD Test Set 2010i	2/02
Fast Transient Burst Generator Model: EFT/B-101	2/02
Current Probe: Singer CP-105	2/02
Current Probe: Solar 9108-1N	2/02
Field Intensity Meter: EFM-018	2/02
KEYTEK Ecat Surge Generator	2/02

02/01/2002

QUALIFICATIONS

Of

SCOT D. ROGERS, ENGINEER

ROGERS LABS, INC.

Mr. Rogers has approximately 13 years experience in the field of electronics. Six years working in the automated controls industry and 6 years working with the design, development and testing of radio communications and electronic equipment.

POSITIONS HELD:

Systems Engineer:	A/C Controls Mfg. Co., Inc. 6 Years
Electrical Engineer:	Rogers Consulting Labs, Inc. 5 Years
Electrical Engineer:	Rogers Labs, Inc. Current

EDUCATIONAL BACKGROUND:

1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.

2) Bachelor of Science Degree in Business Administration Kansas State University.

3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

Scot D Rogers

Scot D. Rogers

February 7, 2002
Date

1/11/00

FEDERAL COMMUNICATIONS COMMISSION
Laboratory Division
7435 Oakland Mills Road
Columbia, MD. 21046

December 08, 2000

Registration Number: 90910

Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053

Attention: Scot D. Rogers

Re: Measurement facility located at Louisburg
3 & 10 meter site
Date of Listing: December 08, 2000

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,

Thomas W. Phillips

Thomas W Phillips
Electronics Engineer