Cert. No. 1152.01
Electrical (EMC)

DATE: 10 February 2004

I.T.L. (PRODUCT TESTING) LTD.

EMC Test

For

EMTS Inc.

Equipment under test:

IntegrAlarm Passive Infra Red Detector

(Transmitter Section)

IA-PIR1

Approved by:_____
I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

Cert. No. 1152.01
Electrical (EMC)

Measurement/Technical Report for

EMTS Inc.

IntegrAlarm Passive Infra Red Detector

(For Transmitter Section)

IA-PIR1

FCC ID:RUF150703

10 February 2004

This report concerns: Original Grant _x_ Class II change

Class B verification ____ Class A verification_____Class I change

Equipment type: Radio Telemetry Transmitter
Request Issue of Grant:
__**x**__Immediately upon completion of review

Limits used:
CISPR 22 _____ Part 15 _x_

Measurement procedure used is ANSI C63.4-2001.

Application for Certification
prepared by:
Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
D.N. Shimshon 99780
Israel
e-mail Sraz@itl.co.il

Applicant for this device:
(different from "prepared by")
Doron Lavee
EMTS Inc.
300 Alden Road
Markham, Ontario, L3R4C1
Canada
Tel: +1-905-946-8589
Fax: +1-905-947-0138
e-mail: doronl@aqi.co.il

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1. General Information

1.1 Administrative Information

Manufacturer:	EMTS Inc.
Manufacturer's Address:	300 Alden Road Markham, Ontario L3E4C1 Canada Tel: +1-905-946-8589 Fax: +1-905-947-0138
Manufacturer's Representative:	Doron Lavee
Equipment Under Test (E.U.T):	IntegrAlarm Passive Infra Red Detector
Equipment Model No.:	IA-PIR1
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	14.12.03
Start of Test:	14.12.03
End of Test:	14.12.03
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15, sub-part C

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The IntegrAlarm wireless security system includes a Control Panel and a number of wireless peripheral units. The system operates on the ISM wireless band of 902-928 MHz, in frequency hopping mode, transmitting short (about 10 ms) packets of data, with each packet transmitted on a different frequency. Time and frequency synchronization is maintained by a synchronization signal transmitted by the system Control Panel to the various peripherals (including the IA-PIR 1) every 3 minutes. The system operates on 56 pseudo random selected channels.

In its present configuration, the system includes five types of peripheral units:

Door / window sensor.

Passive infrared detector.

Smoke detector.

Handheld remote control.

Remote siren.

The PIR detector unit consists of a PIR sensor and circuitry, an RF transceiver, a micro-controller, a non-volatile memory, a power supply, a tamper switch, a test switch and a 3V Lithium HNO_2 battery type 123.

The sensor unit is composed of the following principal parts:

Mounting plate.

Sensor PCB assembly with RF controller PCB, LED and battery.

Inner cover.

Outer cover with IR motion lens.

To reduce false alarms, the PIR is pet-immune and has a selectable alarm threshold (1, 2 or 3 movements in the protected space). Once an alarm has been transmitted, the PIR shuts down for a minimum of 2 minutes. After 2 minutes, the PIR will automatically be rearmed, provided that movement within the protected space has ceased and not resumed.

Depending on the space to be protected, the PIR has either a wide-angle lens, with a 70° viewing angle and a maximum range of 15 m, or a long-range lens, with a 9° viewing angle and a maximum range of 21 m. (The standard lens supplied is the wide-angle lens).

Operating frequency band – ISM 902-928 MHz. The transmitter operation frequency range is 903.5-913.5 MHz.

Mode of operation – frequency hopping; every data packet is transmitted on a different pseudo random selected frequency.

Data packet transmission duration – less than 10 milliseconds.

Data packet validity check – CRC.

Transmission and reception verification – two-way communication; each received packet is acknowledged, with an automatic repeat request (ARQ) in case of unacknowledged data packet.

IR detector sensitivity – Δ 1.6 deg. @ 0.6 m/sec.

Movement speed range – 0.3 to 1.5 m/sec.

Detection field of view @ maximum range with WA lens – 21 m @ 15 m range

Detection field of view @ maximum range with LR lens – 3.5 m @ 21 m range *.

Events reported – movement in room, tamper.

Automatic self-test (transmission of a data packet and receipt of acknowledgment).

Power source – 3V Lithium MNO_2 battery type 123.

Average current drain in normal use – 23 uA

Current drain in "no movement" state – 15 uA

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2001. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing December 12, 2003).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ±4 dB Normalized Site Attenuation requirements of ANSI C63.4-2001. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. Product Labeling

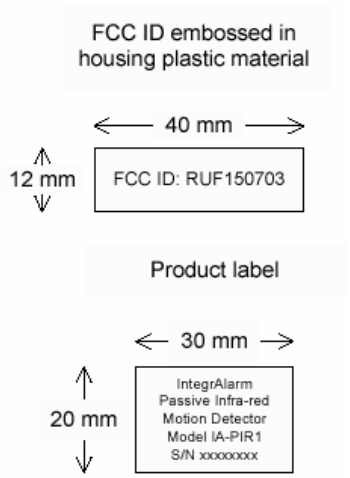

Figure 1. FCC Label

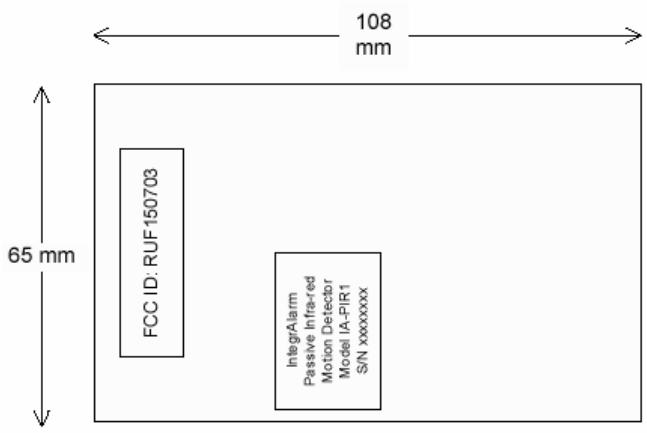

Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 Justification

The E.U.T. is a fixed wall mounted installation, mounted in the vertical position.

During the tests, it was positioned in vertical orientation.

It is impossible to test the IA-PIR 1 under normal operating conditions. This is because the data packets transmitted by the IntegrAlarm system are too short (<10 ms) for the system to be tested for emission levels by any standard test equipment. Moreover, because the system operates in frequency hopping mode, with each packet transmitted on a different frequency, no standard test equipment is capable of synchronizing with the system for test purposes.

Accordingly, the IA-PIR 1 EUT is provided with a Test Mode pushbutton switch on the PCB. Test Mode includes three transceiver options. One press of the Test Mode button selects continuous reception, a second press selects continuous transmission of carrier wave only, a third press selects continuous transmission of modulated signal, and a fourth press returns the EUT to normal operating mode. If continuous transmission of modulated signal is selected, the EUT will transmit binary data (1 – 0 – 1 – 0 ...) at its normal transmission rate.

Test Mode transmission / reception takes place on one of four predefined frequencies (903.500, 913.500, 916.500 or 926.500 MHz). The default is 903.500 MHz. The IA-PIR 1 tamper switch is used to change the frequency while the EUT is in Test Mode.

3.2 EUT Exercise Software

The EUT does not include dedicated exercise software. The test procedure for the EUT is described in Section 3.1 above.

3.3 Special Accessories

No special accessories were needed to achieve compliance.

3.4 Equipment Modifications

No modifications were needed to achieve compliance.

3.5 Configuration of Tested System

Figure 3. Configuration of Tested System

4. Block Diagram

4.1 Schematic Block/Connection Diagram

Intentionally Blank for Reasons of Confidentiality

Figure 4. E.U.T. Block Diagram

4.2 Theory of Operation

The IA-PIR 1 is part of the IntegrAlarm System. This system consists of a Control Panel and a number of Wireless Peripheral Units, such as wireless security sensors, wireless environmental sensors and wireless actuators such as sirens/strobes. Two-way digital communication between the Control Panel and the Wireless Peripheral Units provides full control and supervision of the system by the CP and the Central Station operator.

Each time motion is detected in the space secured by the IA-PIR 1, the IA-PIR 1 sends an event data packet to the Control Panel. This is indicated by a red LED (visible through a window in the IA-PIR 1 outer cover) which illuminates momentarily on the IA-PIR 1. The Control Panel then sends back an acknowledgment data packet, which is indicated by a green LED (visible through a hole in the IA-PIR 1 outer cover) which illuminates momentarily on the IA-PIR 1. If the IntegrAlarm System is armed, the Control Panel then sends a suitable code to the monitoring service (central station) via PSTN.

In addition, if the IA-PIR 1 is tampered with, it sends an alarm data packet to the Control Panel. The Control Panel then sends back an acknowledgment data packet to the IA-PIR 1 and sends an alarm code to the monitoring service via PSTN (even if the Control Panel is not armed).

5. Customer's Declaration

EMTS INC.
300 Alden Road
Markham, Ontario L3R 4C1
Canada

February 09, 2004

DECLARATION

To Whom It May Concern,

I hereby declare that the product, IntegrAlarm IA-PIR1 Passive Infra Red Detector, FCC ID RUF150703, complies with the following requirements of Part 15, Sub-part C, Section 15.247:

1. Number of hopping frequencies, Section 15.247 (a) (1).
2. Channel average time occupancy, Section 15.247 (a) (1).
3. Channel frequency separation, Section 15.247 (a) (1).

Thank you,

D Lavee

Doron Lavee
Engineering Manager
EMTS Inc.

Tel. (905) 946-8477
Fax (905) 947-0138

6. Spurious Radiated Measurement Photos

Figure 5. Spurious Radiated Emission Test. Front

7. Spurious Radiated Emission, Below 1 GHz

7.1 Test Specification

30kHz-1000 MHz, FCC, Part 15, Subpart C

7.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 30kHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

Turning the E.U.T on and off.
Using a frequency span less than 10 MHz.
Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

7.3 Measured Data

The signals in the band 30 kHz – 1.0 GHz were below the spectrum analyzer noise level which is at least 6dB below the specification limit.

TEST PERSONNEL:

Tester Signature: _____ Date: 07.01.04

Typed/Printed Name: E. Pitt

7.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	January 31, 2003	1 year
RF Section	HP	85420E	3427A00103	January 31, 2003	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	April 20, 2003	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 20, 2003	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 17, 2003	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A

7.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[dB\mu v/m]\ FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

8. Spurious Radiated Emission Above 1 GHz

8.1 Radiated Emission Above 1 GHz

The E.U.T operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.
In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements and a High Pass Filter were used. The test distance was 3 meters.
In the frequency range 2.9-9.5 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

8.2 Test Data

JUDGEMENT: Passed by 8.3 dBμV/m

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification. The worst cases were:

for 903.5 MHz, 11.4 dB at 2710.00 MHz frequency, vertical polarization.

for 913.5 MHz, 8.3 dB at 2740 MHz frequency, vertical polarization

The details of the highest emissions are given in Figure 6 to Figure 13.

TEST PERSONNEL:

Tester Signature: _____ Date: 07.01.04

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
Test Distance: 3 meters
Operating Frequency: 903.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Peak

Freq. (MHz)	Peak Amp (dBµV/m)	Correction Factors (dB)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2710.00	56.5	43.5**	74.0	-17.5
3614.00	46.7	6.0*	74.0	-27.3
4517.00	49.4	8.3*	74.0	-24.6

Figure 6. Radiated Emission. Antenna Polarization: HORIZONTAL. Detector: Peak

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
Test Distance: 3 meters
Operating Frequency: 903.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Average

Freq. (MHz)	Average Amp (dBμV/m)	Correction Factors (dB)	Average Result*** (dBμV/m)	Average Specification (dB μV/m)	Peak. Margin (dB)
2710.00	48.6	43.5**	28.6	54.0	-25.4
3614.00	38.8	6.0*	18.8	54.0	-35.2
4517.00	41.9	8.3*	21.9	54.0	-32.1

Figure 7. Radiated Emission. Antenna Polarization: HORIZONTAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Duty Cycle Factor = $20\log\frac{10}{100} = -20dB$

***Average Result = Average Amp + Duty Cycle Factor

Note: Maximum transmission “ON” time is 10 msec.

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Test Distance: 3 meters
Operating Frequency: 903.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Peak

Freq. (MHz)	Peak Amp (dBμV/m)	Correction Factors (dB)	Peak. Specification (dB μV/m)	Peak. Margin (dB)
2710.00	62.6	43.5**	74.0	11.4
3614.00	46.8	6.0*	74.0	27.2
4517.00	50.4	8.3*	74.0	24.4

Figure 8. Radiated Emission. Antenna Polarization: VERTICAL. Detector: Peak

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Test Distance: 3 meters
Operating Frequency: 903.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Average

Freq. (MHz)	Average Amp (dBμV/m)	Correction Factors (dB)	Average Result*** (dBμV/m)	Average Specification (dB μV/m)	Peak. Margin (dB)
2710.00	58.4	43.5**	38.4	54.0	-15.6
3614.00	38.8	6.0*	18.8	54.0	-35.2
4517.00	45.2	8.3*	25.2	54.0	-28.8

Figure 9. Radiated Emission. Antenna Polarization: VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Duty Cycle Factor = $20\log\frac{10}{100} = -20dB$

***Average Result = Average Amp + Duty Cycle Factor

Note: Maximum transmission “ON” time is 10 msec.

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
Test Distance: 3 meters
Operating Frequency: 913.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Peak

Freq. (MHz)	Peak Amp (dBµV/m)	Correction Factors (dB)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2740.00	60.7	43.5**	74.0	-13.3
3654.00	45.5	6.0*	74.0	-28.5
4567.00	48.3	8.3*	74.0	-25.7

Figure 10. Radiated Emission. Antenna Polarization: HORIZONTAL. Detector: Peak

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
Test Distance: 3 meters
Operating Frequency: 913.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Average

Freq. (MHz)	Average Amp (dBμV/m)	Correction Factors (dB)	Average Result*** (dBμV/m)	Average Specification (dB μV/m)	Peak. Margin (dB)
2740.00	56.3	43.5**	36.3	54.0	-17.7
3654.00	34.2	6.0*	14.2	54.0	-39.8
4567.00	38.9	8.3*	18.9	54.0	-35.1

Figure 11. Radiated Emission. Antenna Polarization: HORIZONTAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Duty Cycle Factor = $20\log\frac{10}{100} = -20dB$

***Average Result = Average Amp + Duty Cycle Factor

Note: Maximum transmission “ON” time is 10 msec.

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Test Distance: 3 meters
Operating Frequency: 913.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Peak

Freq. (MHz)	Peak Amp (dBµV/m)	Correction Factors (dB)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2740.00	65.7	43.5**	74.0	-8.3
3654.00	46.7	6.0*	74.0	-27.3
4567.00	49.3	8.3*	74.0	-24.7

Figure 12. Radiated Emission. Antenna Polarization: VERTICAL. Detector: Peak

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description	IntegrAlarm Passive Infra Red Detector
Type	IA-PIR1
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
Test Distance: 3 meters
Operating Frequency: 913.5 MHz

Frequency range: 1.0 GHz to 9.5 GHz
Detector: Average

Freq. (MHz)	Average Amp (dBμV/m)	Correction Factors (dB)	Average Result (dBμV/m)	Average Specification (dB μV/m)	Peak. Margin (dB)
2740.00	62.9	43.5**	42.9	54.0	-11.1
3654.00	37.2	6.0*	17.2	54.0	-36.8
4567.00	42.3	8.3*	22.3	54.0	-31.7

Figure 13. Radiated Emission. Antenna Polarization: VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

* Correction Factor = Antenna Factor + Cable Loss-Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Duty Cycle Factor = $20\log\frac{10}{100} = -20dB$

***Average Result = Average Amp + Duty Cycle Factor

Note: Maximum transmission “ON” time is 10 msec.

8.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	January 31, 2003	1 year
RF Section	HP	85420E	3427A00103	January 31, 2003	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 31,2003	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	9702-5111	May 1, 2003	1 year
Horn Antenna	ARA	SWH-28	1007	October 28, 2003	1 year
Band Pass Filter	SERNO	22102-0001	322	August 15, 2003	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	April 10, 2003	1 year
Spectrum Analyzer	HP	8592L	3926A01204	January 31,2003	1 year
Attenuator	MACOM	ATT-10	N/A	July 27, 2003	1 year
Attenuator	MACOM	ATT-20	N/A	July 27, 2003	1 year

9. Maximum Transmitted Peak Power Output

9.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through EXT ATTT=20dB and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 1 MHz resolution BW. Peak power level was measured at selected operation frequencies.

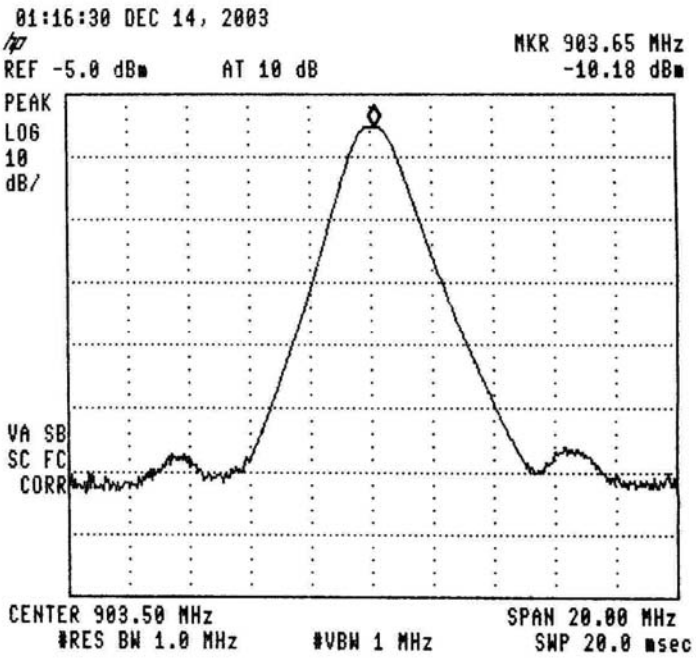

Figure 14.— 903.5 MHz

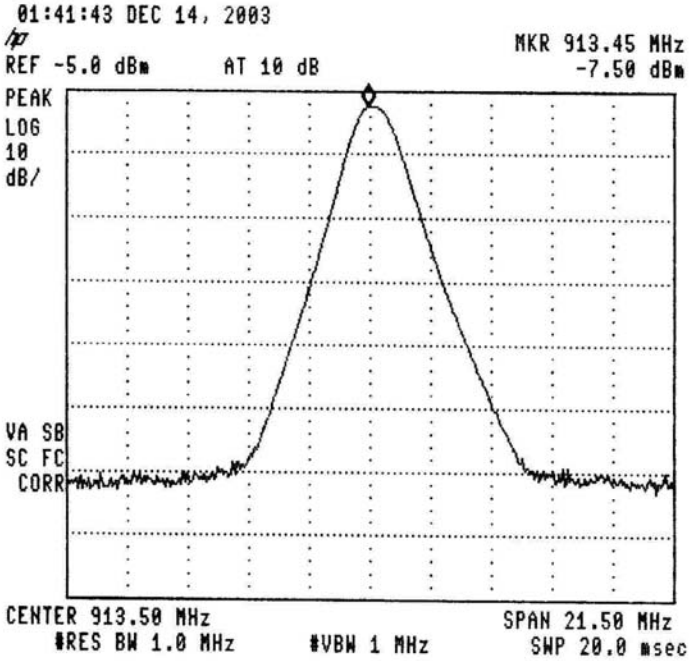

Figure 15.— 913.5 MHz

9.2 Results table

E.U.T. Description: IntegrAlarm Passive Infra Red Detector
Model No.: IA-PIR1
Serial Number: Not Designated
Specification: FCC Part 15, Subpart C

Operation Frequency (MHz)	Reading (dBm)	EXT ATT + CL (dB)	Final Result (dBm)	Specification (dBm)	Margin (dB)
903.5	-10.2	20.5	10.3	30.0	-19.7
913.5	-7.5	20.5	13.0	30.0	-17.0

Figure 16 Maximum Power Output

JUDGEMENT: Passed by 17.0 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 07.01.04

Typed/Printed Name: E. Pitt

9.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 9, 2003	1 year

Figure 17 Test Equipment Used

10. Peak Power Output Out of 902-928 MHz Band

10.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 20dB attenuator and an appropriate coaxial cable. The spectrum analyzer was set to 3.0 kHz resolution BW for the frequency range 30 kHz-300kHz and 100 kHz resolution BW for the frequencies above 300 kHz. The frequency range from 30 kHz to 9.5 GHz was scanned. Level of spectrum components out of the 902-928 MHz was measured at the selected operation frequencies.

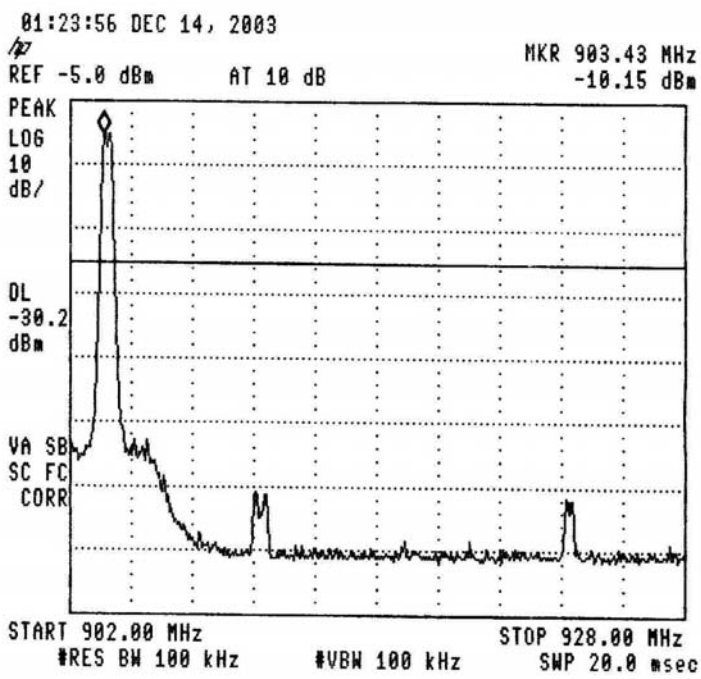

Figure 18.— 903.5 MHz

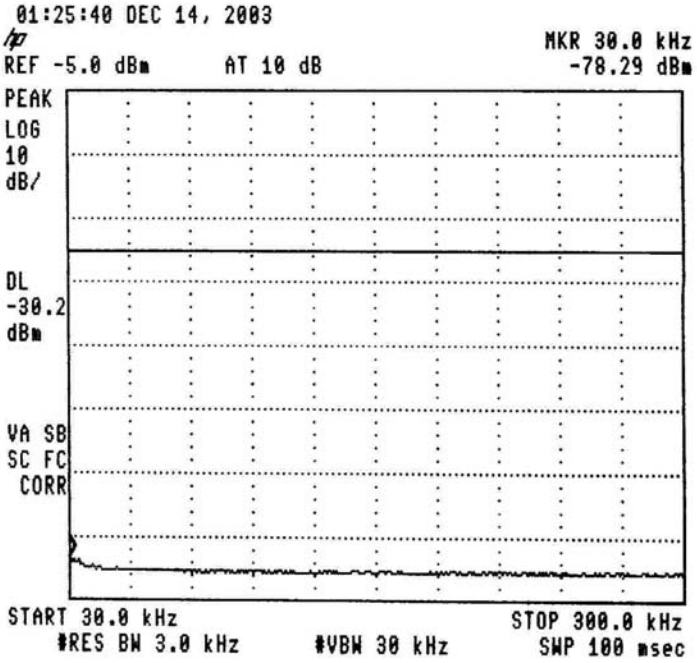

Figure 19.— 903.5 MHz

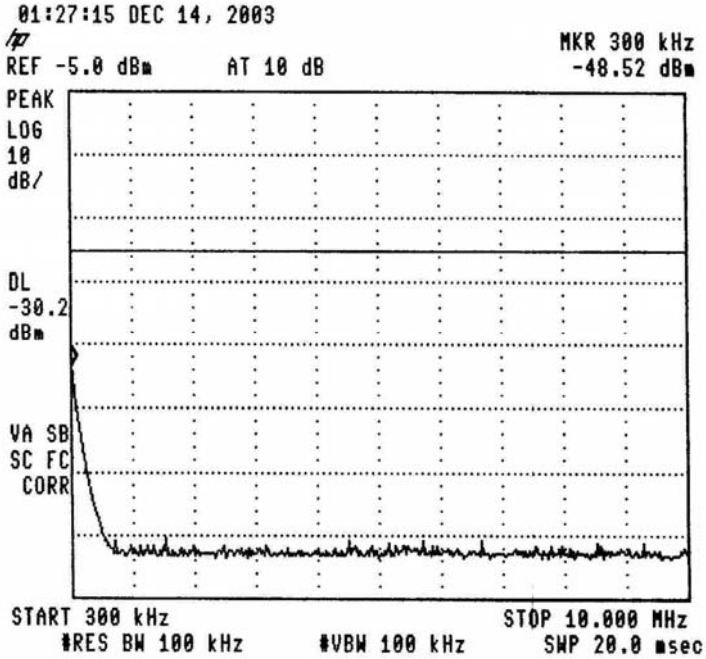

Figure 20.— 903.5 MHz

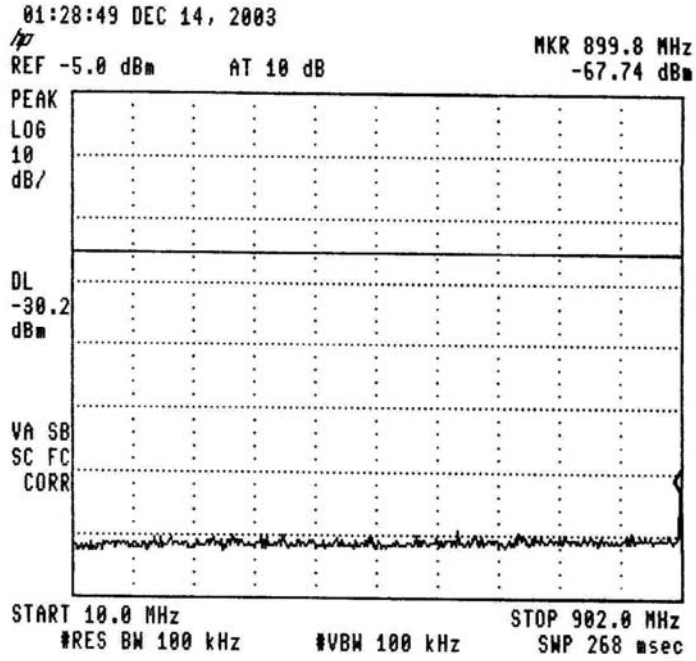

Figure 21.— 903.5 MHz

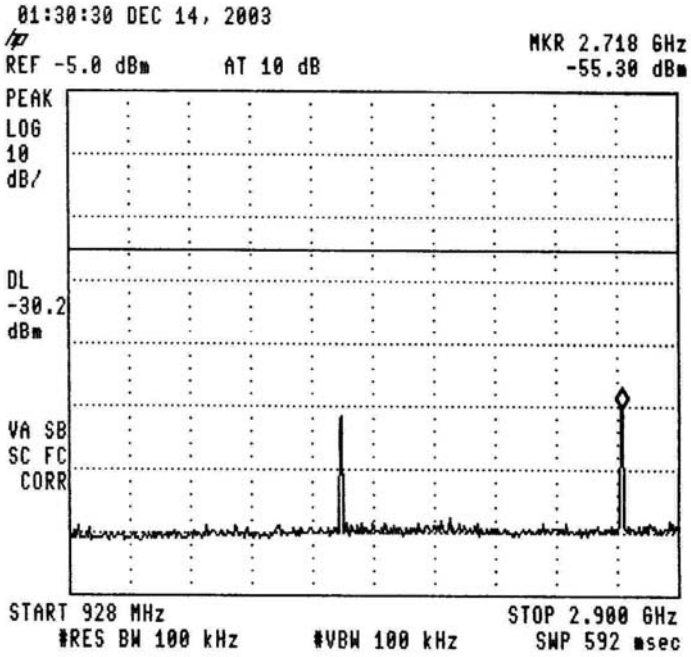

Figure 22.— 903.5 MHz

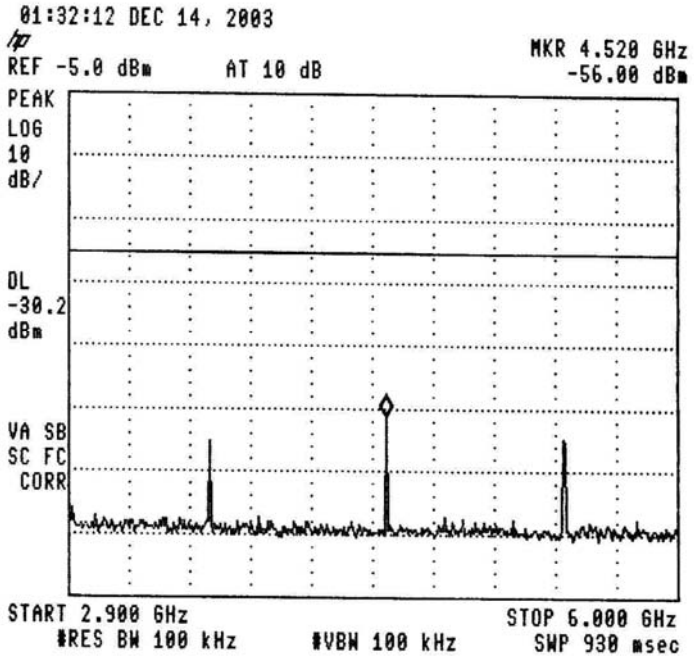

Figure 23.— 903.5 MHz

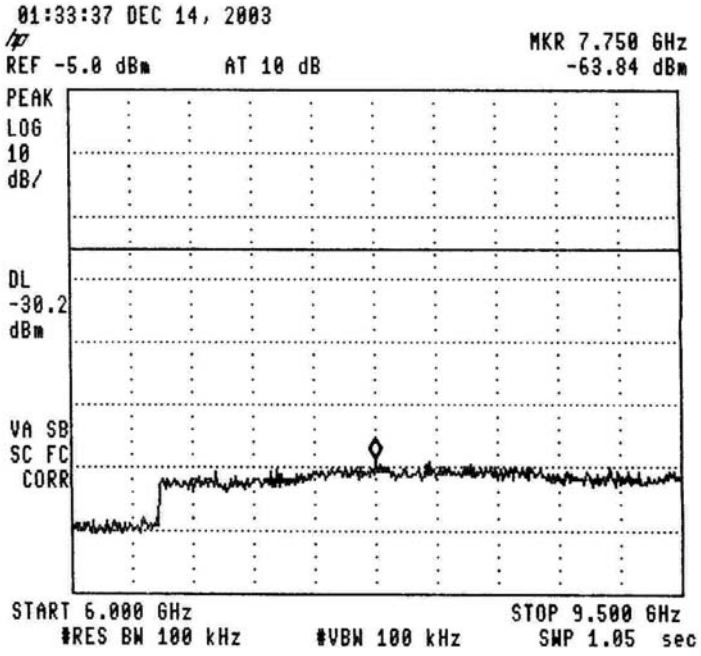

Figure 24.— 903.5 MHz

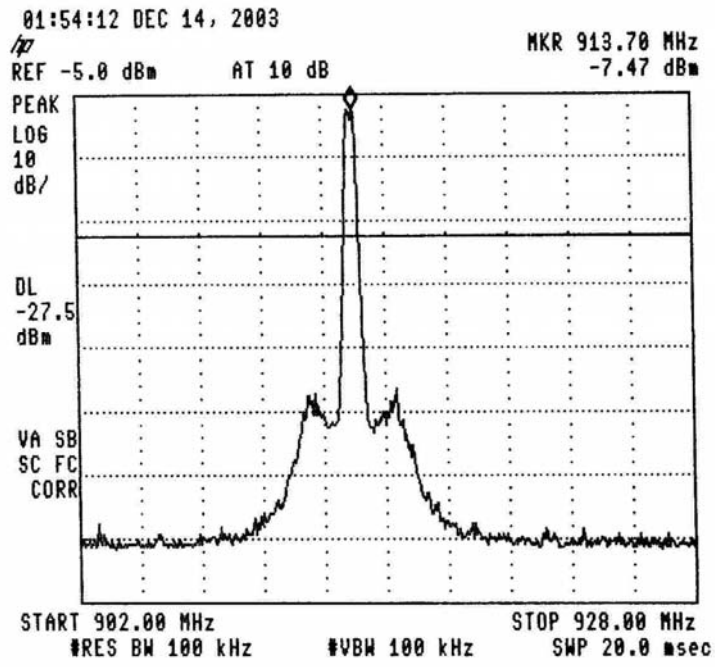

Figure 25.— 913.5 MHz

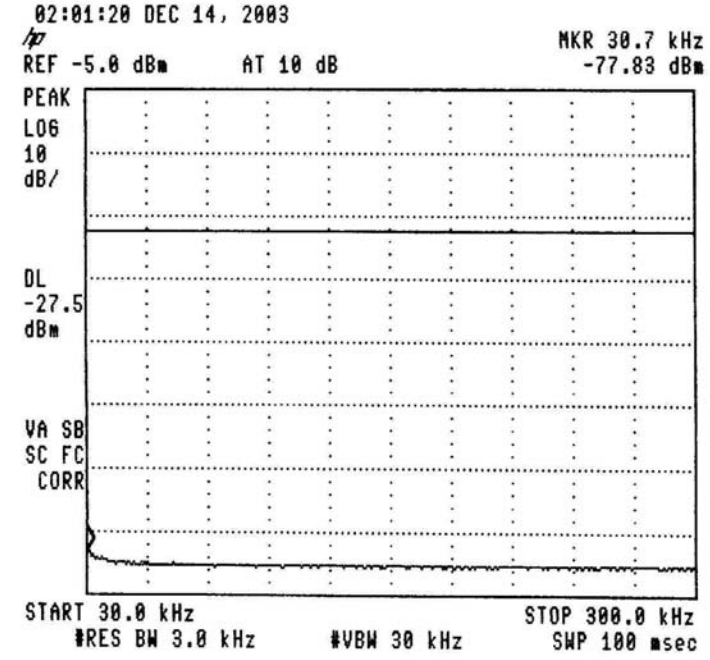

Figure 26.— 913.5 MHz

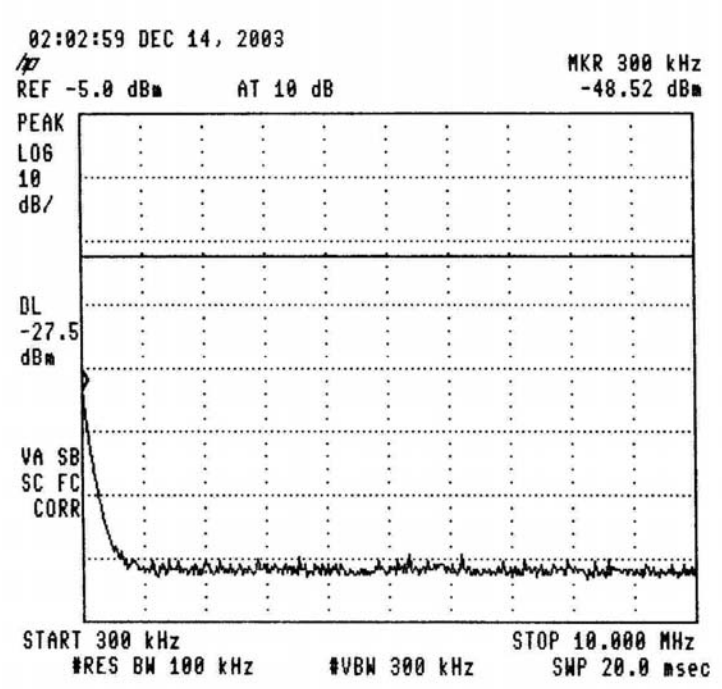

Figure 27.— 913.5 MHz

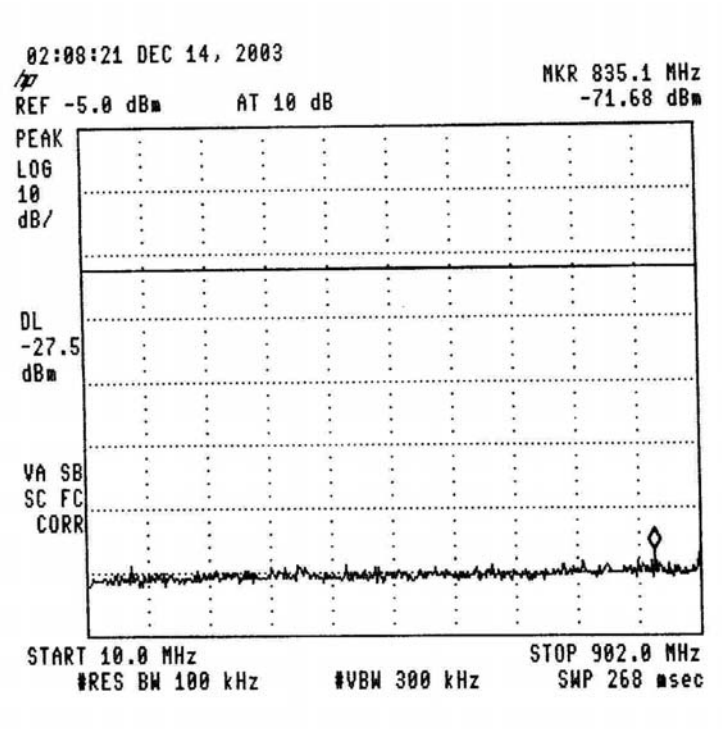

Figure 28.— 913.5 MHz

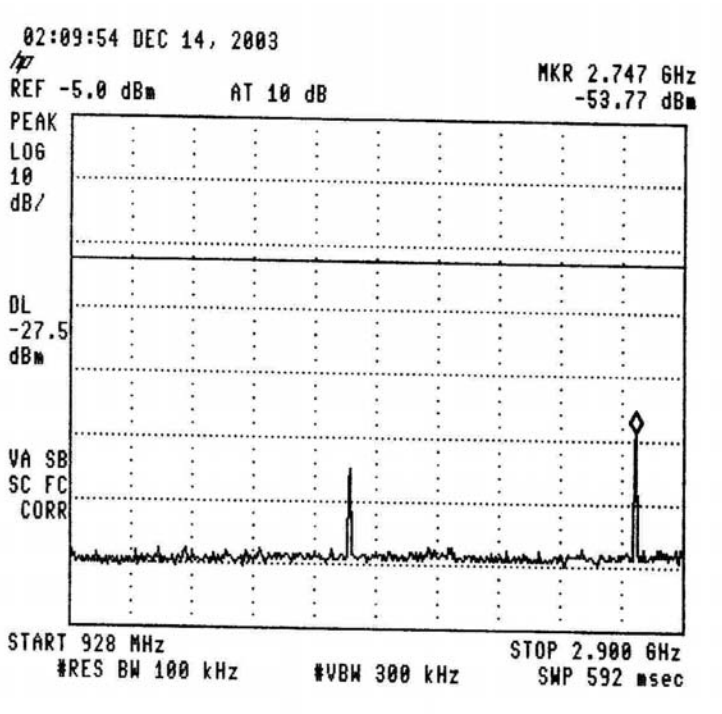

Figure 29.— 913.5 MHz

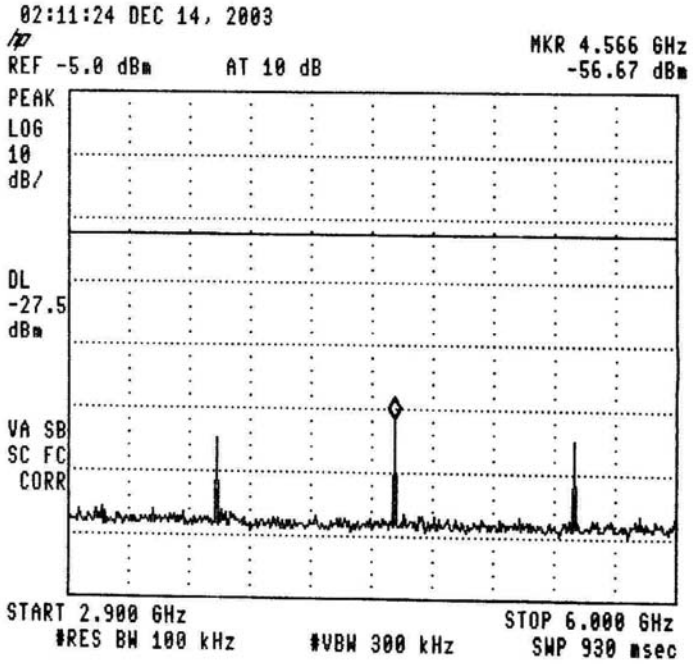

Figure 30.— 913.5 MHz

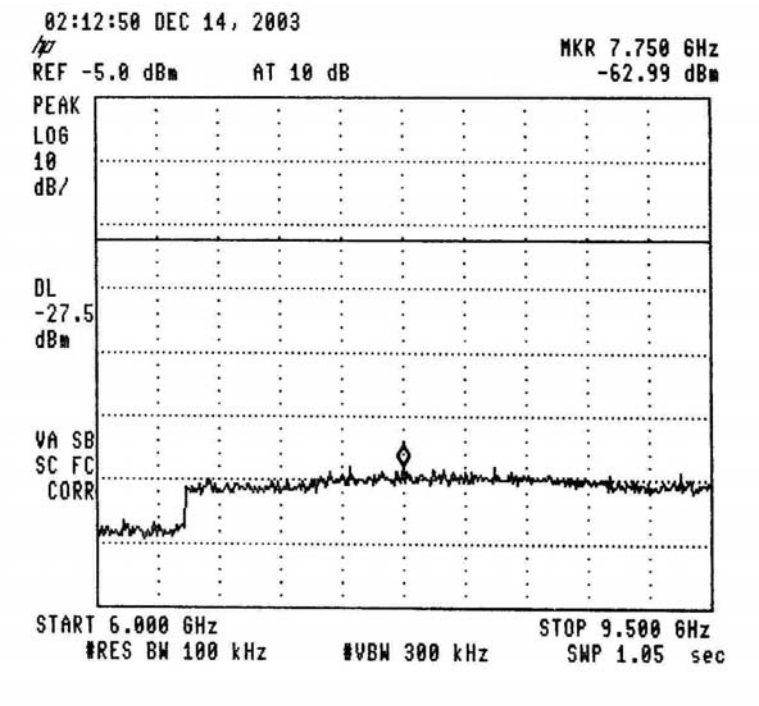

Figure 31.— 913.5 MHz

10.2 Results table

E.U.T. Description: IntegrAlarm Passive Infra Red Detector
Model No.: IA-PIR1
Serial Number: Not Designated
Specification: FCC Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBc)	Specification (dBc)	Margin (dB)
903.5	38.4	20.0	18.4
913.5	41.1	20.0	21.1

Figure 32 Peak Power Output of 902-928 MHz Band

JUDGEMENT: Passed by 18.4 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 07.01.04

Typed/Printed Name: E. Pitt

10.3 Test Equipment Used.

Peak Power Output of 902-928 MHz Band

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 20, 2003	1 year

Figure 33 Test Equipment Used

11. 20 dB Bandwidth

11.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through a 20dB attenuator and an appropriate coaxial cable. The spectrum analyzer was set to 10 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 20 dB below maximum peak power was measured and recorded.

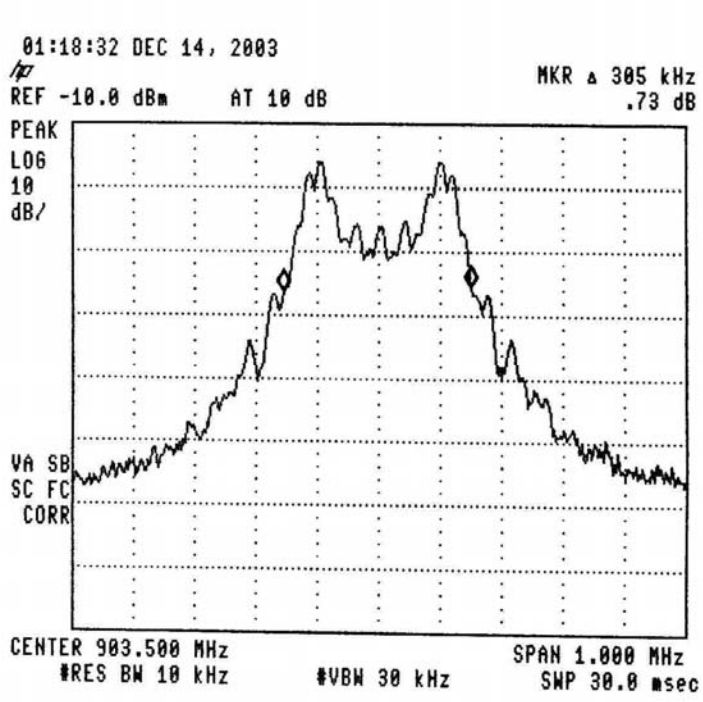

Figure 34 — 903.5 MHz

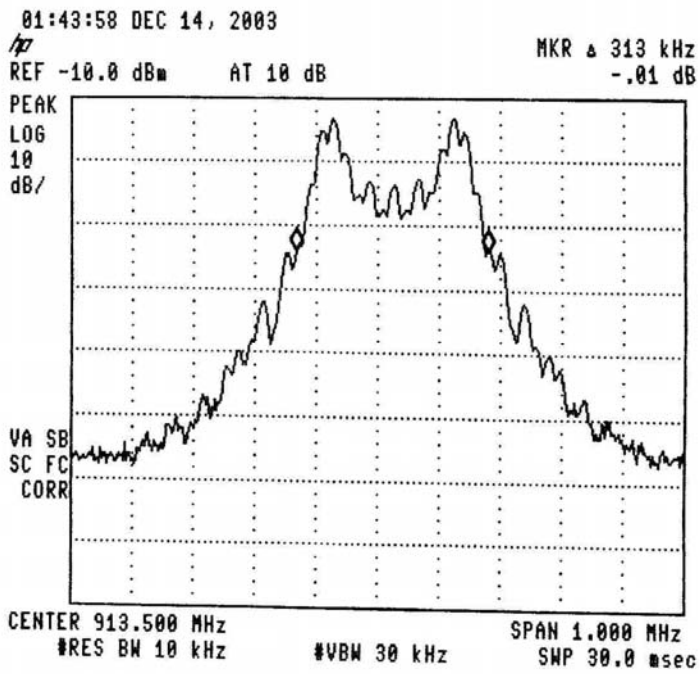

Figure 35 — 913.5 MHz

11.2 Results table

E.U.T. Description: IntegrAlarm Passive Infra Red Detector
Model No.: IA-PIR1
Serial Number: Not Designated
Specification: FCC Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Reading (kHz)	Specification (kHz)	Margin (kHz)
903.5	305.0	500.0	-195
913.5	313.0	500.0	-185

Figure 36 20 dB Bandwidth

JUDGEMENT: Passed by 185 kHz

TEST PERSONNEL:

Tester Signature: _____ Date: 07.01.04

Typed/Printed Name: E. Pitt

11.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 20, 2003	1 year

Figure 37 Test Equipment Used

12. Band Edge Spectrum

[In Accordance with section 15.247(c)]

12.1 Test procedure

Enclosed are spectrum analyzer plots for the lowest operation frequency (903.5 MHz) and the highest operation frequency (913.5 MHz) in which the E.U.T. is planned to be used.

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 20dB attenuator and an appropriate coaxial cable. The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 902 MHz and above 928 MHz was measured relative to power level at 903.5 MHz and 913.5 MHz correspondingly.

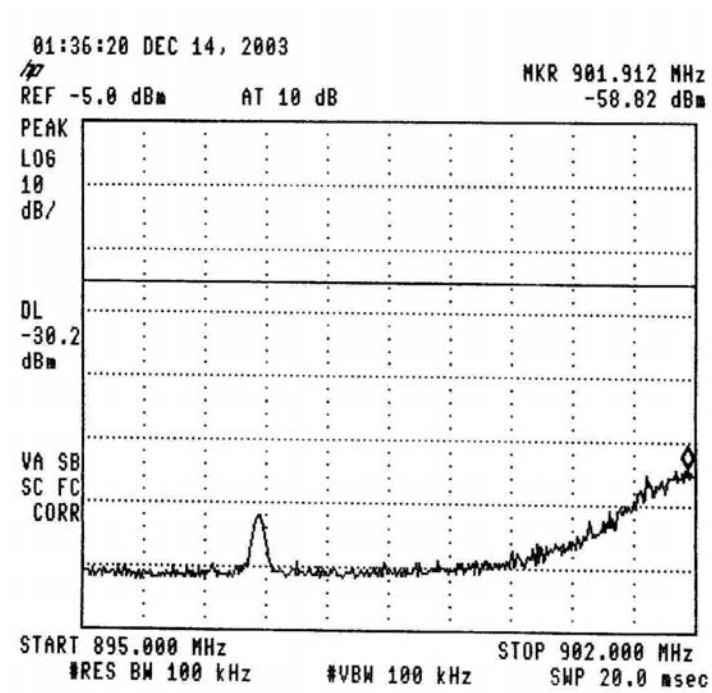

Figure 38 — 903.5 MHz

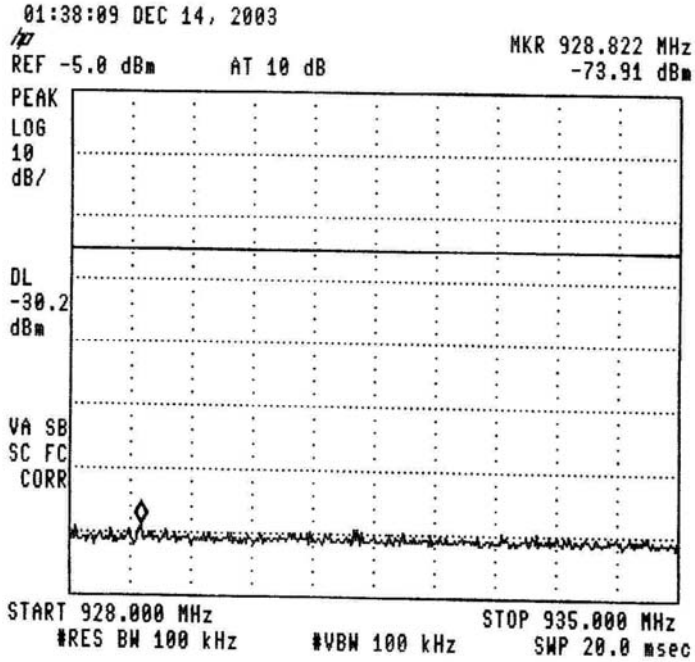

Figure 39 — 903.5 MHz

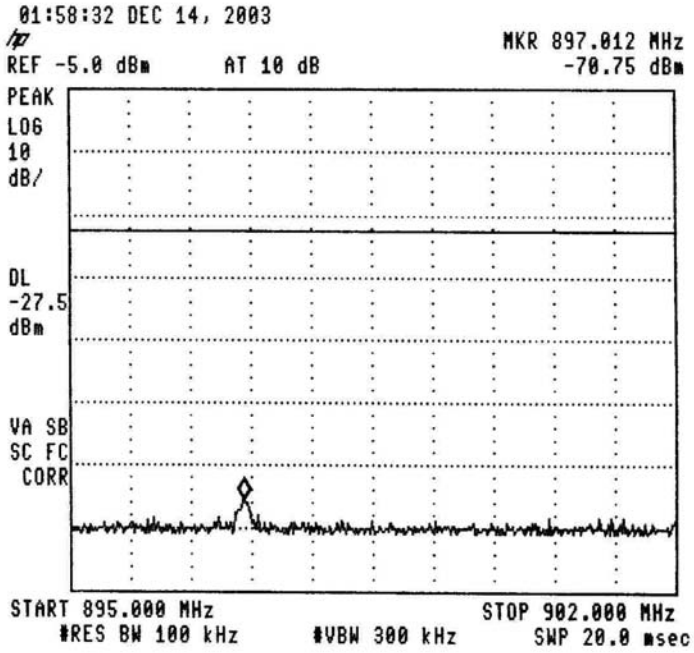

Figure 40 — 913.5 MHz

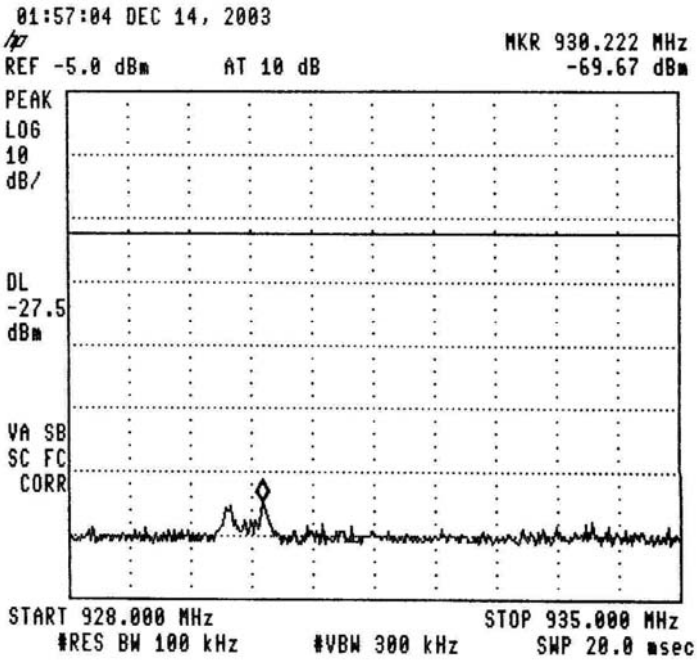

Figure 41 — 913.5 MHz

12.2 Results table

E.U.T. Description: IntegrAlarm Passive Infra Red Detector
Model No.: IA-PIR1
Serial Number: Not Designated
Specification: FCC Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBc)	Specification (dBc)	Margin (dB)
903.5	902.0	48.7	20.0	28.7
913.5	930.2	62.2	20.0	42.2

Figure 42 Band Edge Spectrum

JUDGEMENT: Passed by 28.7 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 07.01.04

Typed/Printed Name: E. Pitt

12.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacture	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	January 31, 2003	1 year
Cable	Avnet	MTS	N/A	September 20, 2003	1 year

Figure 43 Test Equipment Used

13. Antenna Gain

The gain of the antenna is 0dBi.

14. R.F Exposure/Safety

The E.U.T. is a wall mounted, fixed installation. The typical distance between the E.U.T. and the general population in normal use is at least 0.5m.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(a) Considering the worst case FCC limit at the operating frequency of 903.5 MHz the FCC limit is:

$$S = \frac{903.5}{1500} = 0.60 \frac{mW}{cm^2}$$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power: +15dBm=31.6mW (max. measured power, +13dB at 913.5MHz)

G_T- Antenna Gain: 1=(0dBi)

R- Distance from Transmitter using 20cm worst case

(c) The peak power density is :

$$S_p = \frac{31.6x1}{4\pi(20)^2} = 6.3x10^{-3} \frac{mW}{cm^2}$$

(d) The duty cycle of transmission in actual worst case is 10msec “on” and 200msec “Off”.

The average power over 30 minutes is:

$$P_{AV} = \frac{31.6 \times 10}{200} = 1.58mW$$

(e) The averaged power density of the E.U.T. is:

$$S_{AV} = \frac{1.58X1}{4\pi x(20)^2} = 0.31X10^{-3} \frac{mW}{cm^2}$$

(f) This is more than 3 orders of magnitude below the FCC limit.

15. Photographs of Tested E.U.T.

Figure 44 Front View

Figure 45 Rear View With Wall Mounting Assembly

Figure 46 Wall Mounting Assembly

Figure 47 Rear View Battery Cover Removed

Figure 48 Front Cover Internal View

Figure 49 PCB in Unit

Figure 50 PCB Side 1

Figure 51 PCB Side 1 Shield Removed

Figure 52 PCB Side 1 Area Under Shield

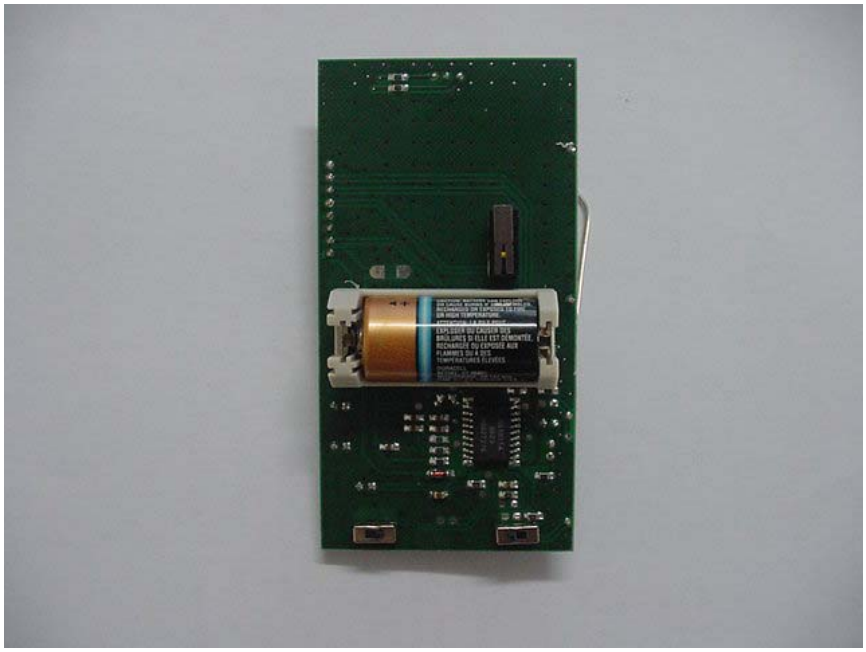

Figure 53 PCB Side 2