REV	Δ	Description	Sheet Effected	Date	Drawn	Checked
A				17.03.04	D.Lanuel	S.Cohen
B				07.03.05	D.Lanuel	S.Cohen

EMC Laboratory

SA-01-G-PIR

FCCID: GCD-SA01G
Manufactured by
Rosslare Ltd.

EMC Test Report

According FCC Part 15 Requirements

Feb 2005

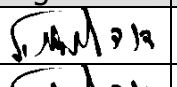
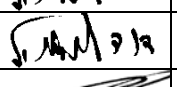
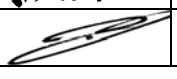
	Function/Title	Name	Signature	Date
Prepared by	Test Engineer	D.Lanuel		07.03.05
Checked by	Test Engineer	D.Lanuel		07.03.05
Approved by	EMC Lab. Manager	S.Cohen		07.03.05

Table of Contents

Para Page

1 INTRODUCTION....3
2 TEST SUMMARY AND SIGNATURES. 4
3 E.U.T INFORMATION....5
4 BANDWIDTH OF THE EMISSION PART 15.231—TEST RESULTS....6
5 FIELD STRENGTH OF FUNDAMENTAL PART 15.231-TEST RESULTS 7
6 RADIATED EMISSION PART 15.231 & 15.205-TEST RESULTS....9
7 RADIATED EMISSION PART 15.109-TEST RESULTS. 13
8 PLOTS....15
9 CORRECTION FACTORS....25
10 ABBREVIATIONS AND ACRONYMS....27
11 PHOTOS....28

1 INTRODUCTION

a. Scope

This document describes the measurement procedures and tests for FCC part 15 of the SA-01-G-PIR Manufactured by Rosslare Ltd.

b. Description of equipment Under Test

Equipment Under Test:	SA-01-G-PIR
FCCID	GCD-SA01G
Manufacturer:	Rosslare Ltd.
Serial Numbers:	3004276
Mode of Operation:	TX MODE
Receiver operating frequency:	433.92MHZ
Year of Manufacture:	2004

c. Applicant Information:

Applicant:	Rosslare Enterpriser Ltd.
Applicant Address	FLAT 12, 9/F WING FAT IND BLDG. 12 WANG TAI RD., KOWLOON BAY. KOWLOON HONG KONG
Telephone:	+972-3-9386838
FAX:	+972-3-9386830
The testing was observed by: Following applicant's personnel:	ALAN GREEN

d. Test Performance:

Date of reception for testing:	10.03.04
Dates of testing	11.03.04
Test Laboratory Location	TADIRAN EMC LAB , Hashoftim 26 Holon 58102 ISRAEL Tel: 972-3-5574476 Fax: 972-3-5575320
Applicable EMC Specification:	Federal Communication Commission (FCC), Code of Federal Regulations 47, FCC Docket 89-103,Part 15: Radio Frequency Devices, Sections 15.109, 15.209 & 15.231.

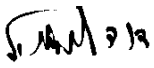
2 TEST SUMMARY AND SIGNATURES.

TADIRAN EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC Part 15 Regulations for Class B equipment.

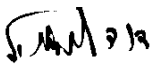
The E.U.T was found to comply with the requirements of the FCC Part 15 Regulations given below

Test	Test Description	Section	PASS/FAIL
1	Bandwidth of the emission	15.231	PASS
2	Field strength of fundamental	15.231	PASS
3	Radiation emission	15.109	PASS
4	Radiation emission	15.231 & 15.205	PASS

a. Test performed by:

Mr. D. Lanuel Test Engineer 

b. Test Report prepared by:

Mr. D. Lanuel Test Engineer 

c. Test Report Approved by:

Mr. Samuel Cohen EMC Lab. Manager

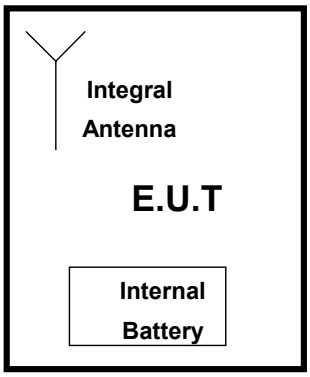
3 E.U.T INFORMATION

a. E.U.T description

1.1 The SA-01 Passive InfraRed (PIR) detector is a small wall-mounted security device – to be installed in residential and small commercial establishments.
1.2 The SA-01 is a stand-alone unit, operating only on internal battery power supply. The unit consists of one (1) PCB, one (1) microcontroller – which controls the detector operation, and a RF transmitter section. The unit does not have a RF receiver section.
1.3 The SA-01 PIR has one RF channel, at 433.92 Mhz carriers with OOK modulation.
1.4 The SA-01 PIR in active mode transmits identification and status signals in 100ms. A supervisory transmission from the SA-01 to the control panel occurs for the same time of one transmission (100 ms), every 20 minutes per hour.
1.5 The battery used is 3vdc lithium, CR123A - replaceable.

b. E.U.T Test Configuration

E.UT. test configuration is shown in figure bellow



c. E.U.T Mode of Operation description

(1) 433.92MHz TX Mode operated by battery

4 BANDWIDTH OF THE EMISSION PART 15.231—TEST RESULTS

E.U.T:	SA-01-G-PIR S/N 3004276
Test Method:	ANSI 63.4
Date:	02/06/03
Relative Humidity:	29%
Ambient Temperature:	21c
Air Pressure:	1053hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel **Date** 11/03/04

a. Test Results Summary & Conclusions

The E.U.T was found in compliance with Bandwidth of Radiated Emission fundamental frequency requirement

b. Limits of bandwidth

The test unit shall meet the limits of Table 1

Table- 1 Limits For Bandwidth

Frequency (MHz)	Bandwidth Max Limits (%)	Bandwidth Max Limits (KHz)
433.92	0.25	1085

c. Test Instrumentation and Equipment

Table- 2 **Test Instrumentation and Equipment**

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
Broadband Antenna	BTA-L	FRANKONIA	10.04.06

d. Test Results

Table- 3 **Bandwidth Test Result**

Frequency (MHz)	Bandwidth (KHz)	Bandwidth Max Limit(KHz)	Plot No	PASS/FAIL
433.92	81.445	1085	Plot-1	PASS

e. Procedure

The Bandwidth is determined at the point 20db down from the modulated carrier, while the spectrum analyzer was set to "max hold" and R.BW –10KHz.

5 FIELD STRENGTH OF FUNDAMENTAL PART 15.231-TEST RESULTS

E.U.T:	SA-01-G-PIR S/N 3004276
Test Method:	ANSI 63.4
Date:	09/06/03
Relative Humidity:	29%
Ambient Temperature:	20c
Air Pressure:	1053hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel **Date** 11/03/04

a. Test Results Summary & Conclusions

The E.U.T was found in compliance with fundamental frequency requirement

b. Limits of Field Strength for fundamental according 15.231

The test unit shall meet the limits of Table 4.

Table- 4 **Limits For Fundamental**

Frequency (MHz)	Average Max Limits (dBμV/m)	Peak Max Limits (dBμV/m)
433.92	81	101

c. Test Instrumentation and Equipment

Table- 5 **Test Instrumentation and Equipment**

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
Broadband Antenna	BTA-L	FRANKONIA	10.04.06

d. Test Results

Table- 6 **Average Factor**

TX Period(min)	Duty Cycle(min)	Average Factor(db)	Plot Ref
11.52msec	11.52/100=0.1152	20log0.1152=-18.7	11

Table- 7 **Peak Result of Fundamental**

Frequency (MHz)	Peak Result (dBμV/m)	peak Limits (dBμV/m)	Margined (dB)	Plot No	Pass/ Fail
433.916	98	101	3	Plot-2	PASS

Table- 8 **Average Result of Fundamental**

Peak Result (dBμV/m)	Average Factor	Calculation Results	Average Limits (dBμV/m)	Margined (dB)	Pass/ Fail
98	-18.7	79.3	81	-1.7	PASS

e. Test Procedure

The EUT was placed on the top of rotating table 0.8 meters above the ground and the table was rotated 360°, the height of antenna is varied from one to 4 meters (vertical and horizontal polarization) to determine the max field strength of fundamental

6 RADIATED EMISSION PART 15.231 & 15.205-TEST RESULTS

E.U.T:	SA-01-G-PIR S/N 3004276
Test Method:	ANSI 63.4
Date:	11/06/03
Relative Humidity:	29%
Ambient Temperature:	21c
Air Pressure:	1053hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel **Date** 11/03/04

a. Test Results Summary & Conclusions

The E.U.T was found in compliance with 15.231

b. Limits of Radiated Interference Field Strength according 15.231

The test unit shall meet the limits of Table 9.

Table- 9 **Limits For 15.231(b)**

Frequency range(MHz)	Average Limits (dBμV/m)	peak Limits (dBμV/m)
0.009 – 3500	61	81

c. Test Instrumentation and Equipment

Table- 10 **Test Instrumentation and Equipment**

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
Rode Antenna(10KHz-30MHz)	95010-1	ETN	13.11.05
Double Ridge Guide Antenna(1-18GHz)	3105	EMCO	24.04.05
Broadband Antenna	BTA-L	FRANKONIA	10.04.05
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.05
Low Noise Amplifier (1-2GHz)	SMC-09	MITEQ	14.01.05
Low Noise Amplifier (2-6GHz)	SMC-09	MITEQ	14.01.05

d. Preliminary Test Results

Table- 11 Preliminary Test Results for intentional Emissions in TX Mode 15.231

Antenna Polarization	Freq. Range MHz	Res. BW (kHz)	Plot No.	PASS/FAIL
Both Hour.& Ver	0.009 – 0.15	0.2	Plot-3	Pass
	0.15 - 30	9	Plot-4	Pass
	30-1000	120	Plot-5	Pass
	1000-2.800	1000	Plot-6	Pass
	2.800-5000	1000	Plot-7	Pass

e. Final Results

Table- 12 **Six Highest Peak Emission Test Results**

Mode Of Operation	Freq. (MHz)	peak Reading (*) (dBμV/m)	Limit dBμV/m	Margin (dB)	Pass/Fail
TX	1301.748	58.9	74*	15.1	PASS
	2169.58	62.2	81	18.8	PASS
	2603.496	62.8	81	18.2	PASS

***Restricted bands**

Table- 13 **Six Highest Average Emission Test Results**

Mode Of Operation	Freq. (MHz)	Calculated (dBμV/m)	Limit dBμV/m	Margin (dB)	Pass/Fail
TX	1301.748	40.2	54	17.5	PASS
	2169.58	43.5	61	21.2	PASS
	2603.496	44.1	61	20.6	PASS

f. Test Procedure

(1) **Preliminary Test Procedure**

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a chamber shielded

b) The E.U.T was set 3 meters away from the receiving antenna, which was mounted on the top of a variable-height antenna tower.

c) The Antenna height varied from one meter above the ground over its full-allowed range of travel and the table was rotated 360°to determine the maximum value of the field strength

d) The antenna was set both horizontal and vertical polarization.

(2) **Final Test Procedure**

a) The EUT was tested at open area for each suspected emission

b) The test procedure was performed according paragraph (1) and figure 11

g. Final Test Setup

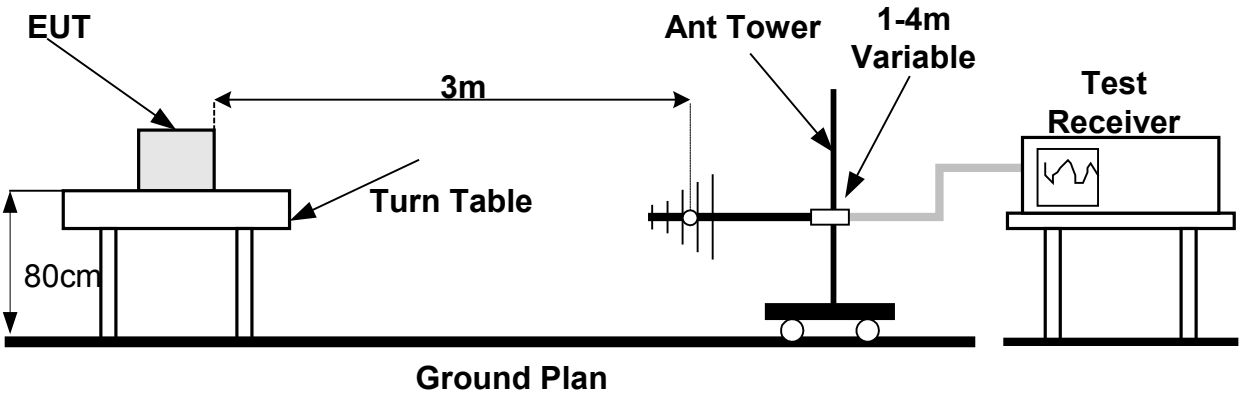


Figure 11 Radiated Emission Set up

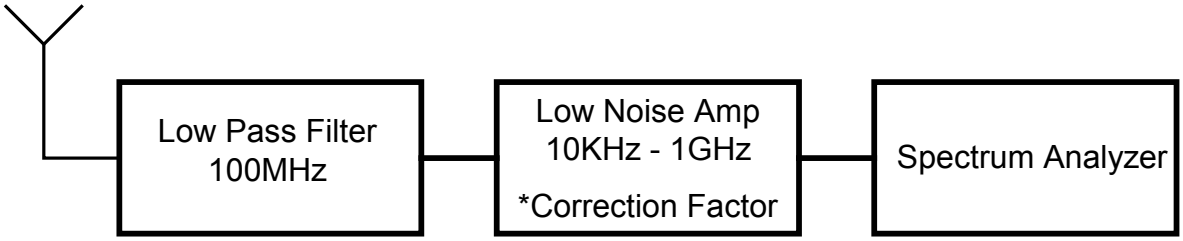


Figure 12 Radiated Emission test 10KHz – 30MHz

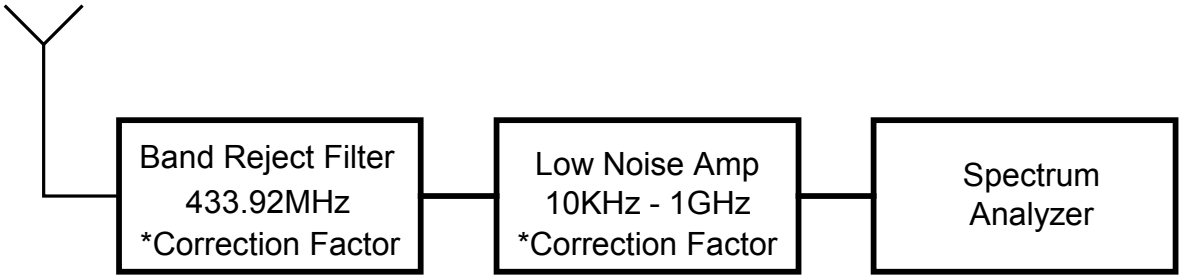


Figure 13 Radiated Emission test 30MHz – 1GHz

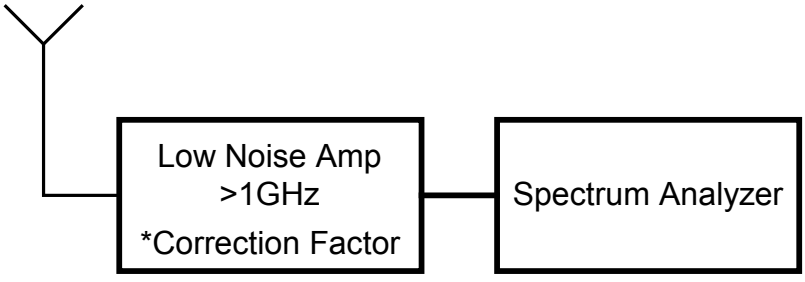


Figure 14 Radiated Emission test above 1GHz

7 RADIATED EMISSION PART 15.109-TEST RESULTS.

a. Preliminary Radiated emission Test Result According Part 15.109

E.U.T:	SA-01-G-PIR S/N 3004276
Test Method:	ANSI 63.4
Date:	10/06/03
Relative Humidity:	29%
Ambient Temperature:	21c
Air Pressure:	1053hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel **Date** 11/03/04

b. Test Results Summary & Conclusions

The E.U.T was found in compliance with 15.109

c. Limits of Radiated Interference Field Strength according 15.109

The test unit shall meet the limits of Table 14 for Class B equipment.

Table/ 14 **Limits For 15.109 Class B equipment**

Frequency Range (MHz)	Quasi-peak Limits (dBμV/m)
30 - 88	40
88 - 216	43
216 - 960	46
960 - 2000	54

d. Test Instrumentation and Equipment

Table- 15 **Test Instrumentation and Equipment**

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
Double Ridge Guide Antenna(1-18GHz)	3105	EMCO	24.04.05
Broadband Antenna(30-1000MHz)	BTA-L	FRANKONIA	10.04.05
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.05
Low Noise Amplifier (1-2GHz)	SMC-09	MITEQ	14.01.05
Low Noise Amplifier (2-6GHz)	SMC-09	MITEQ	14.01.05

e. Preliminary Results

Table- 16 Preliminary Test Results for Unintentional Emissions in RX Mode 15.109

Configuration	Antenna Polarization	Freq. Range MHz	Res. BW (kHz)	Plot No.	PASS/FAIL
TX	Both	30-1000	120	Plot-9	Pass
		1000-2.800	120	-	Pass
		2000-50000	2000	-	Pass

f. Final Test Results

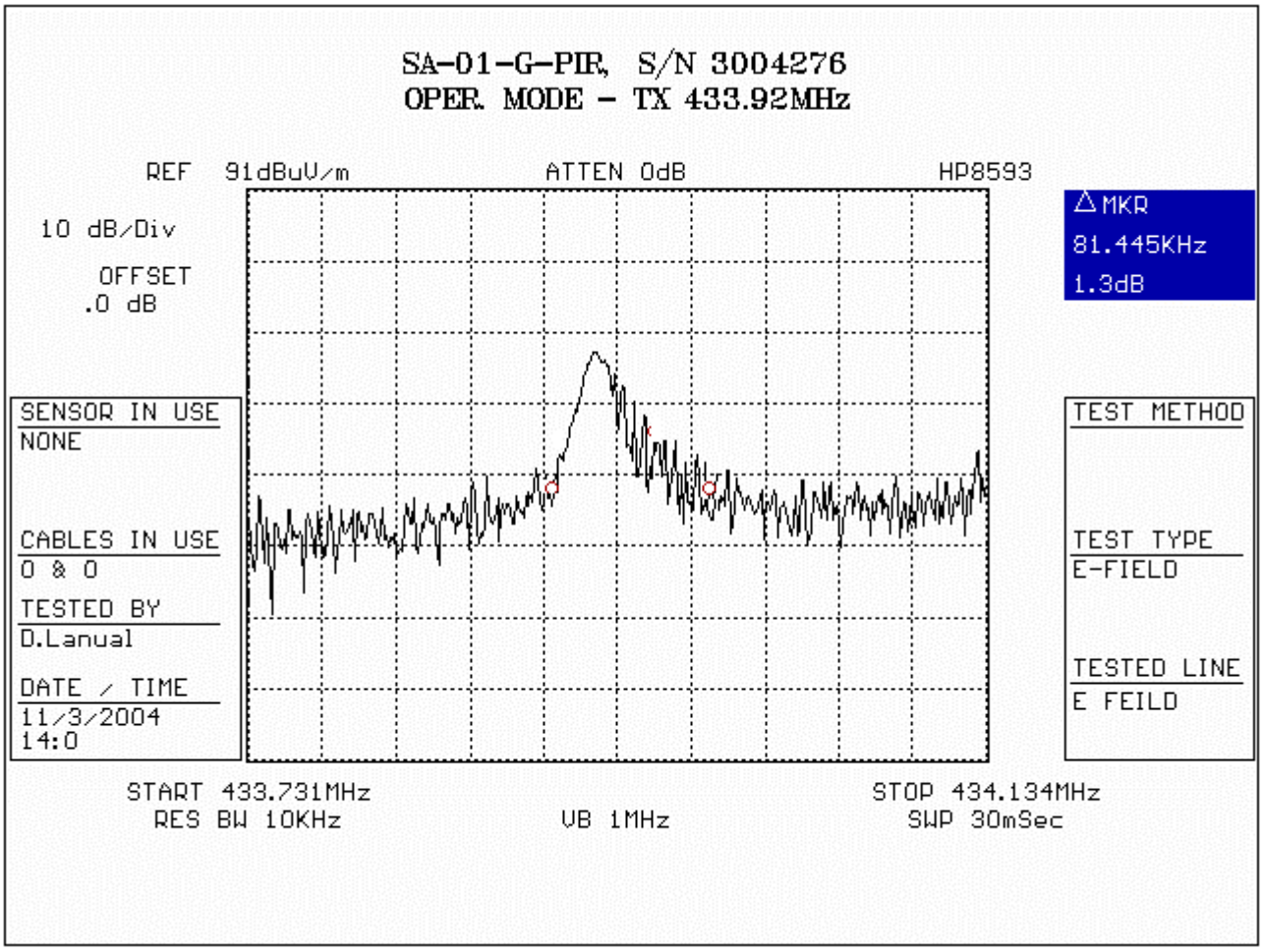
Table- 17 **Six Highest RX Mode 15.109**

Mode Of Operation	Freq. (MHz)	peak Reading (*) (dBμV/m)	Limit dBμV/m	Margin (dB)	Polarity Ver/Hor	Height (m)
TX	30-1000	The Emissions are at least 25db below the unintentional limits				
	1000-5000	No Emission-Background noise only				

g. Test Procedure

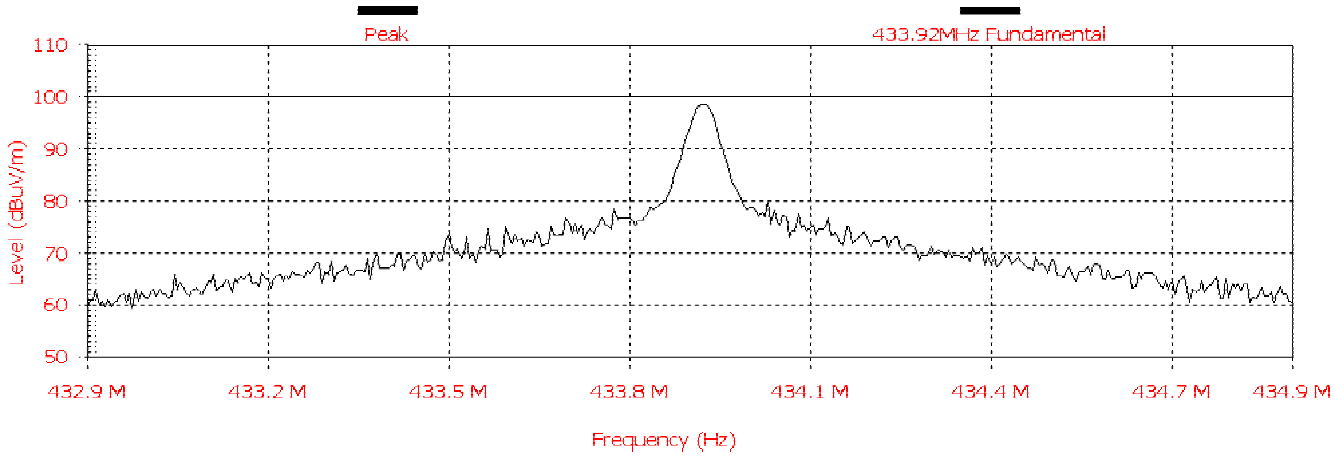
See paragraph 6.f

8 PLOTS

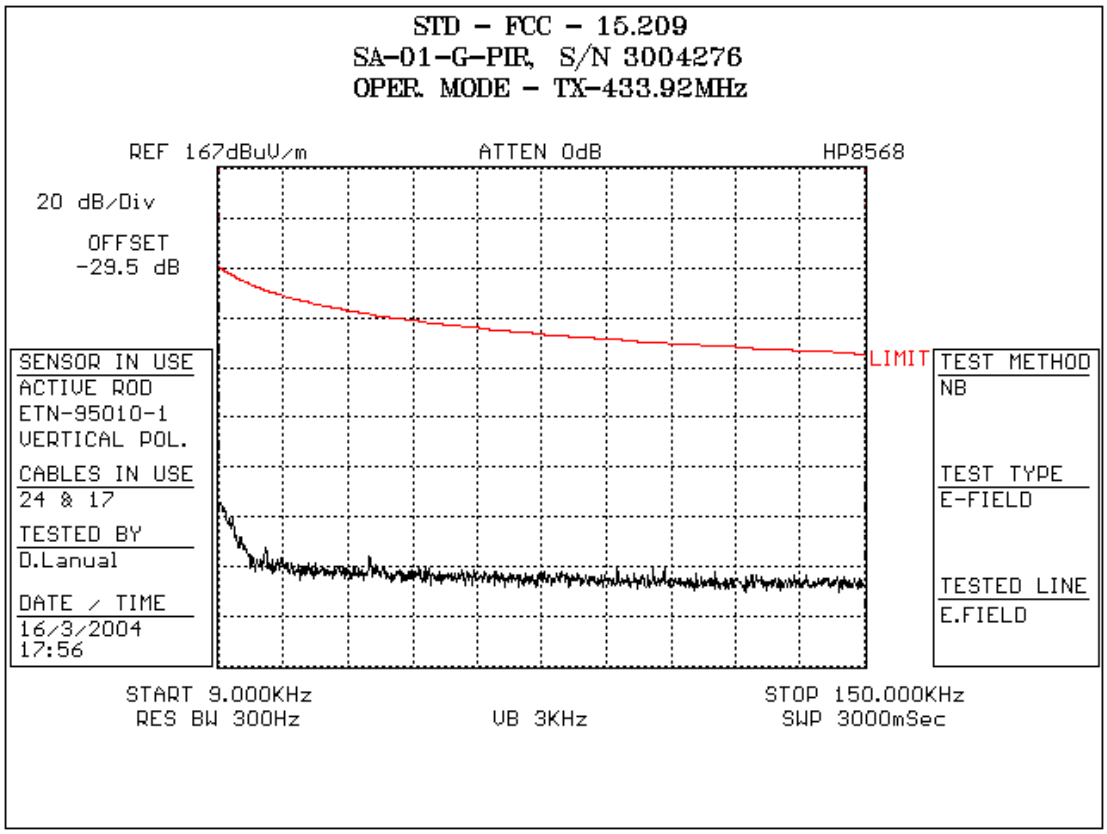


Plot 1 Bandwidth

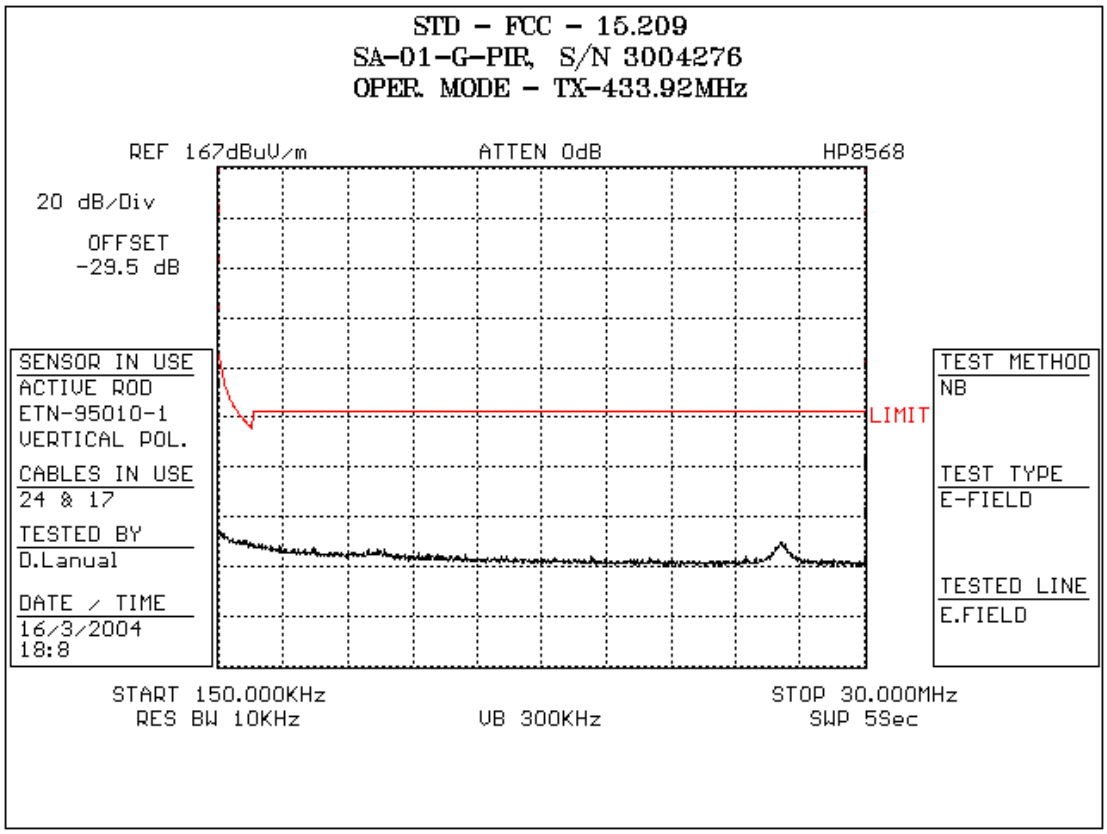
Frequency (MHz)	Pk
433.916	98



Plot 2 Field strength of fundamental



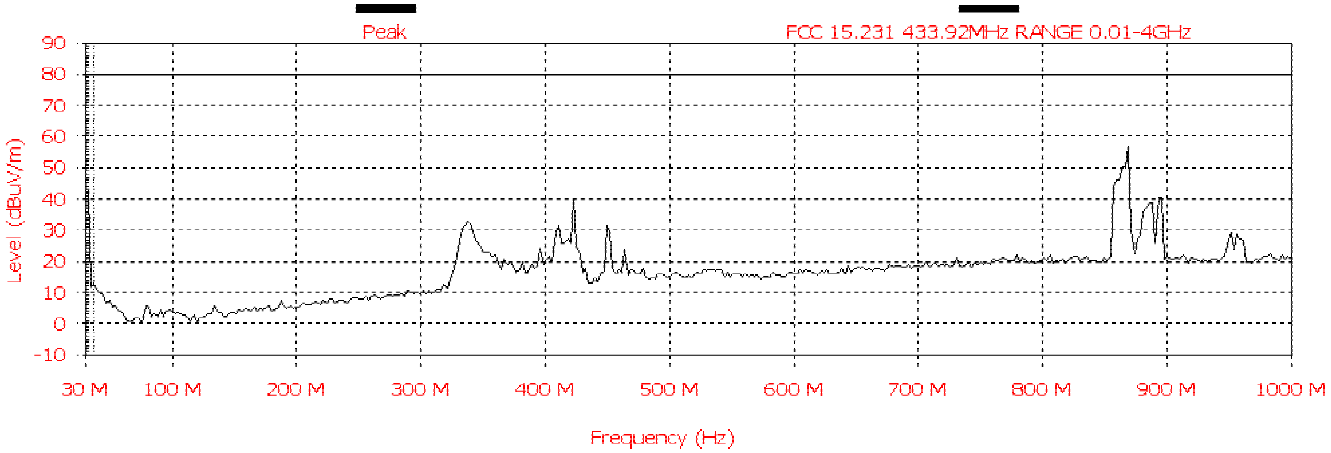
Plot 3 15.231 Radiated Emission



Plot 4 15.231 Radiated Emission

Frequency (MHz)	QP
422.22	40
872.22	56

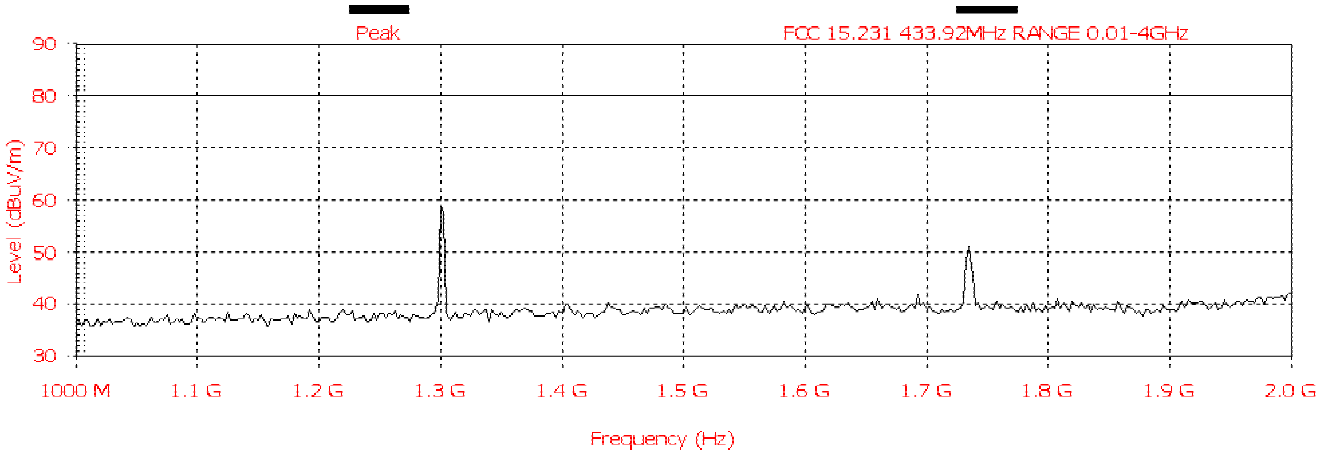
Analyzer setting: R.BW-120K, V.BW-1MHz, QP detector



Plot 5 -15.231 Radiated Emissions

Frequency (MHz)	QP
1301.748	58.9
1735.4	51

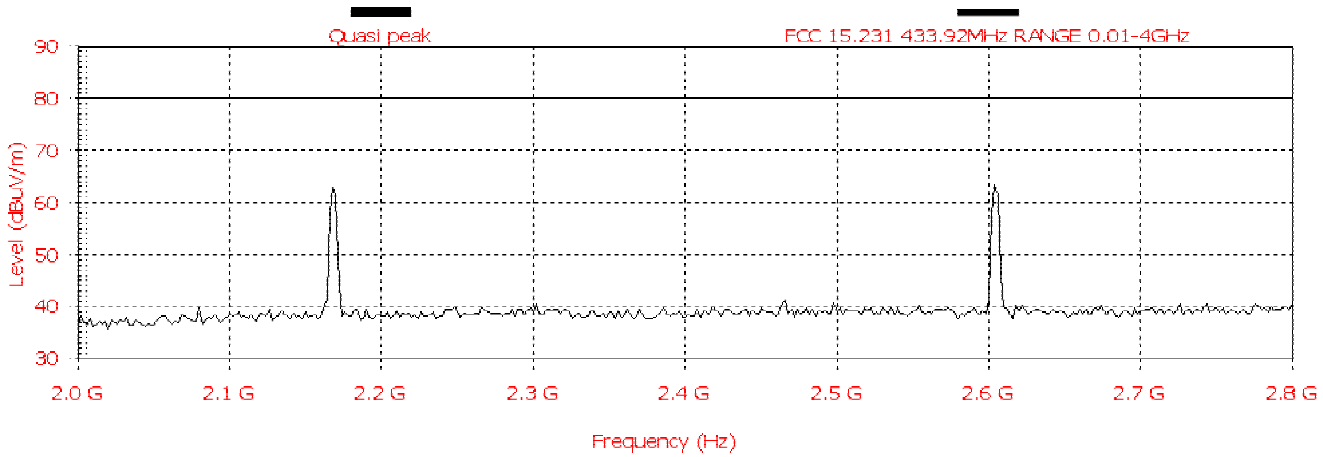
Analyzer setting: R.BW-1M, V.BW-3MHz, peak detector



Plot 6 -15.231 Radiated Emission

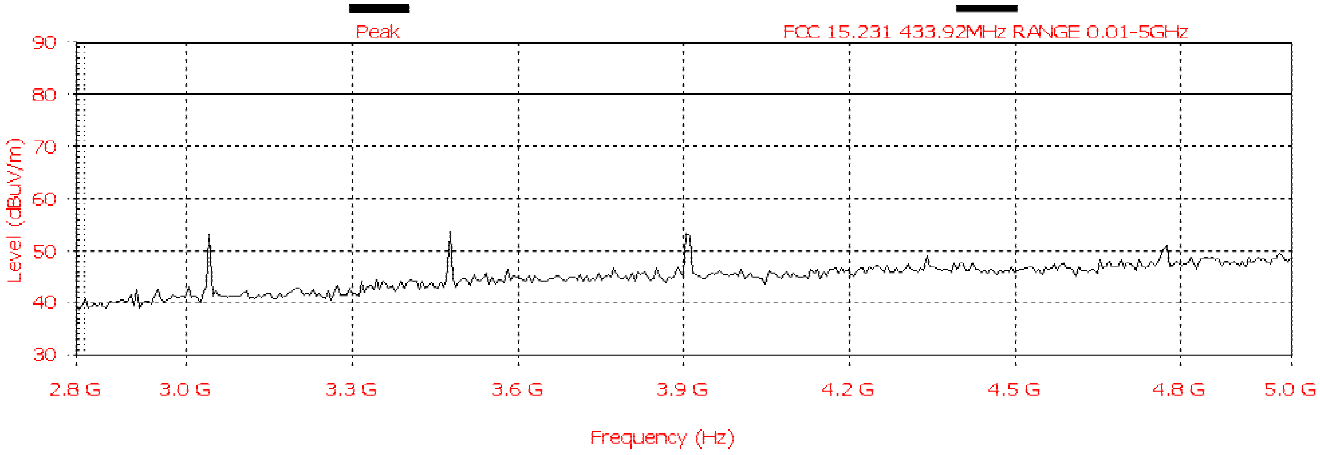
Frequency (MHz)	QP
2169.58	62.2
2603.496	62.8

Analyzer setting: R.BW-1M, V.BW-3MHz, peak detector



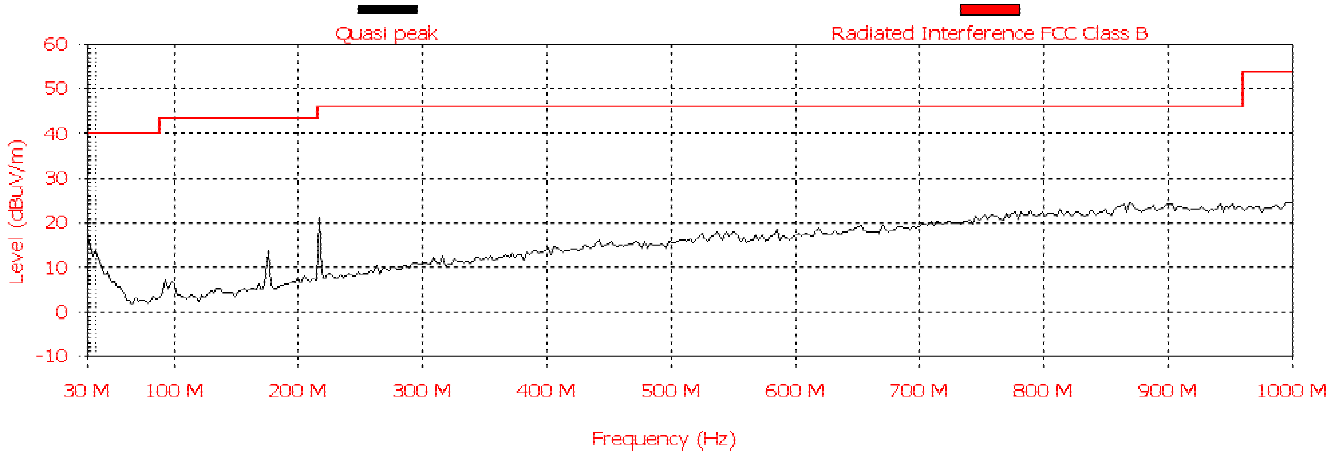
Plot 7 -15.231 Radiated Emission

Analyzer setting: R.BW-1M, V.BW-3MHz, peak detector

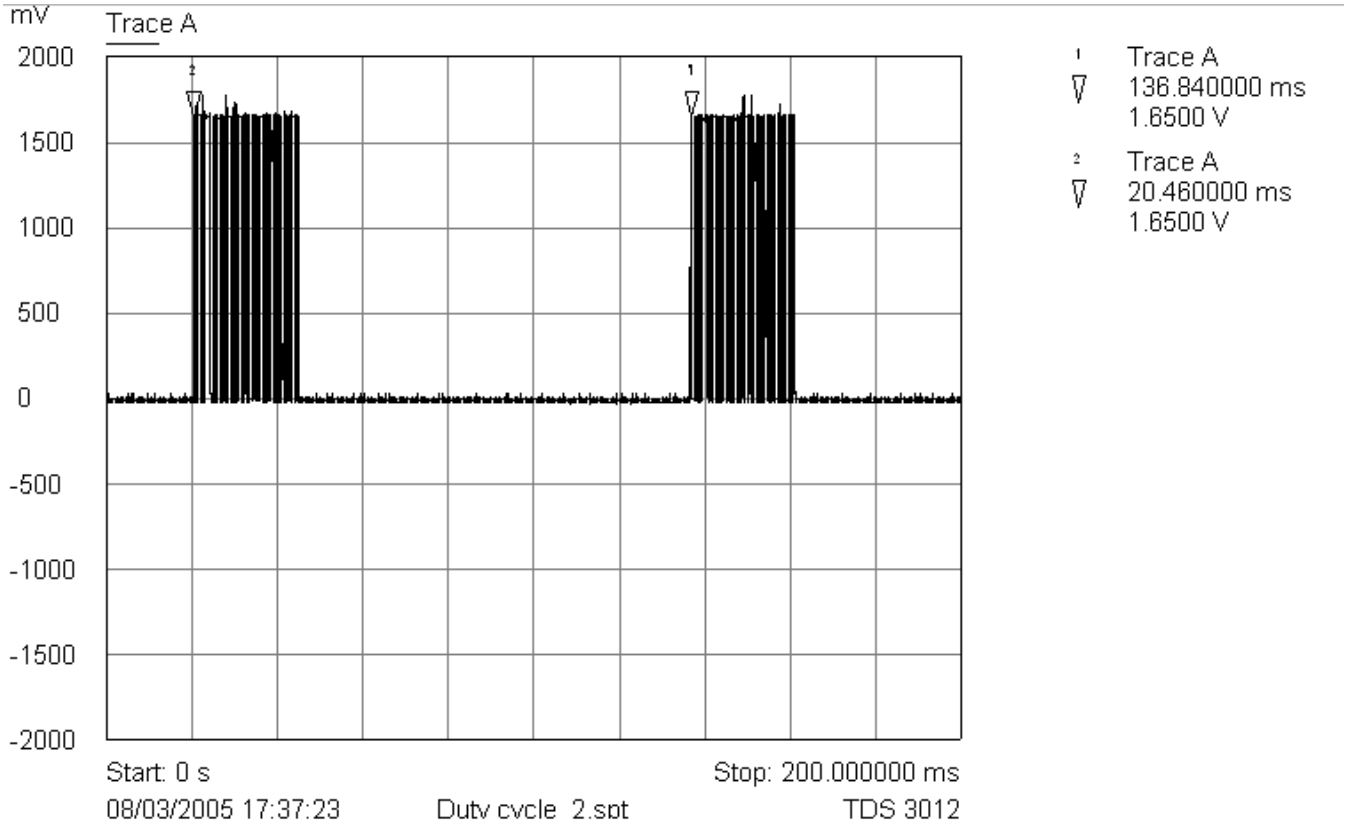


Plot 8 -15.231 Radiated Emission

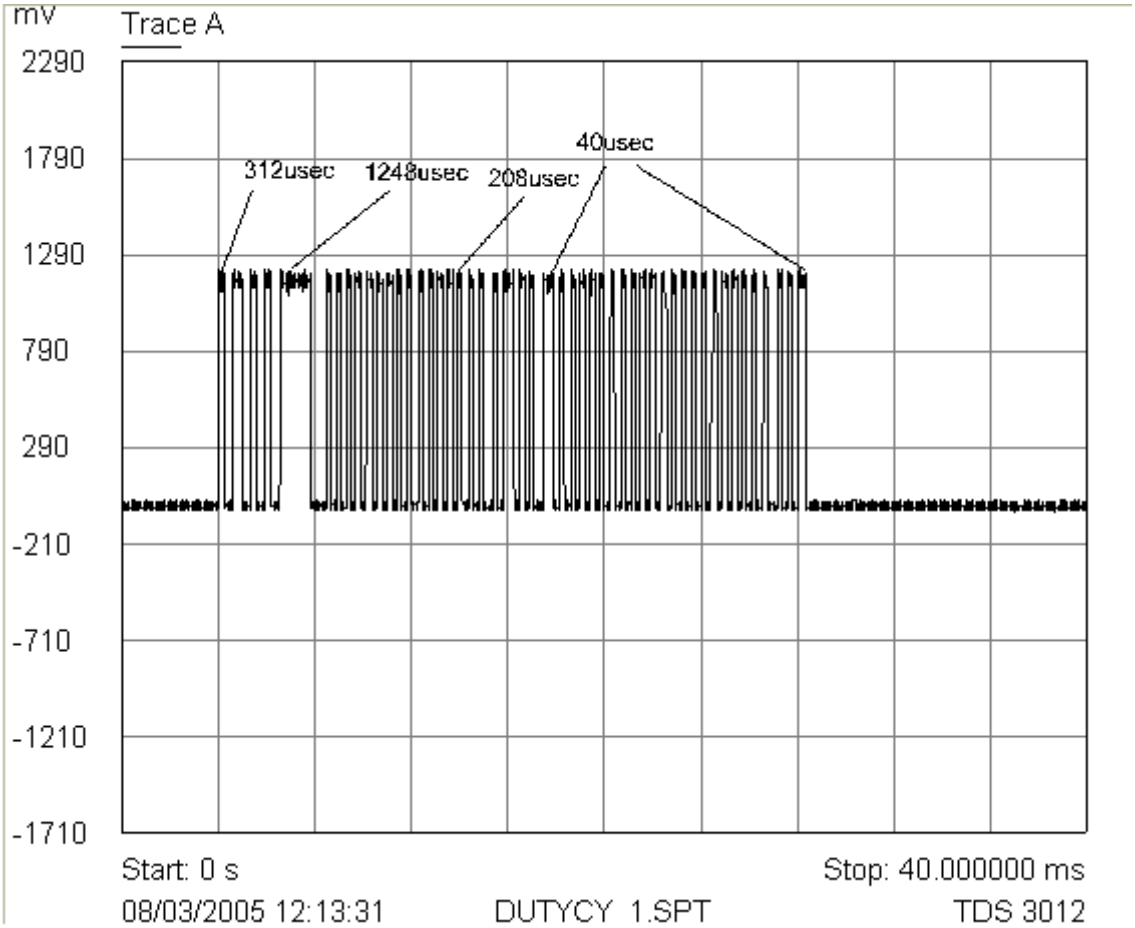
Analyzer setting: R.BW-120K, V.BW-1MHz, QP detector



Plot 9 -15.109 Radiated Emission

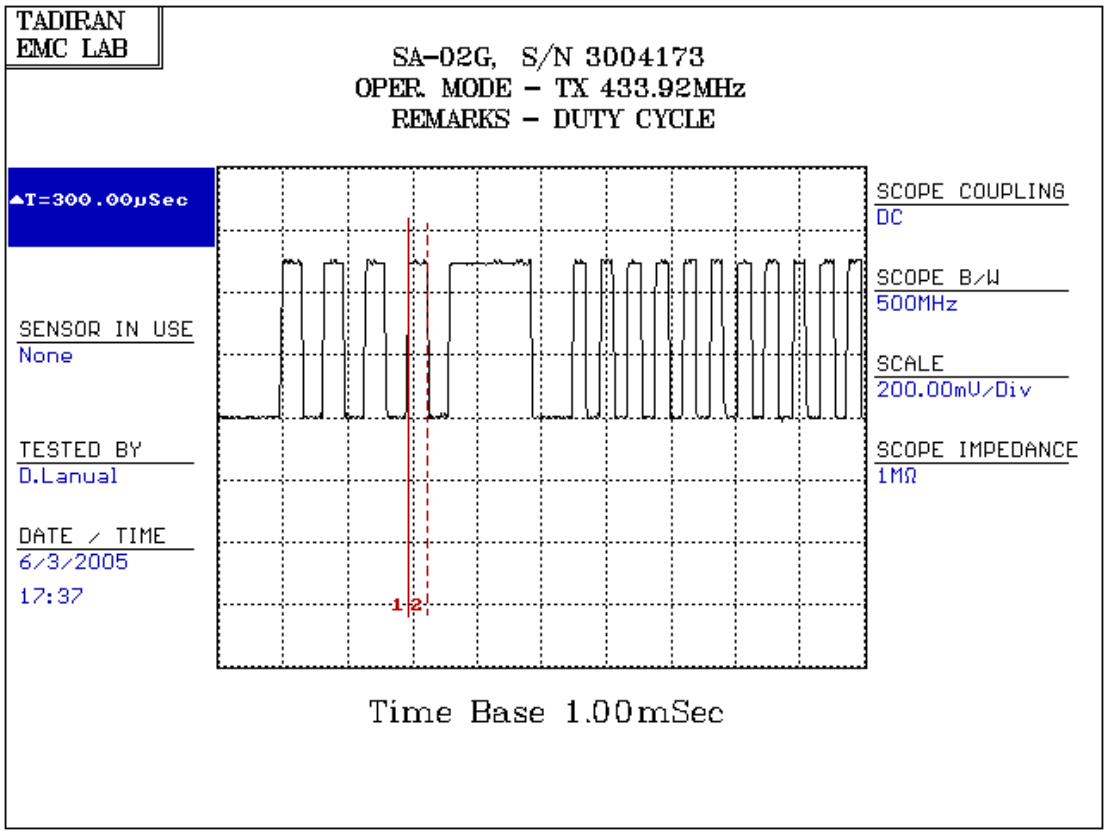


Plot 10 Duty Cycle

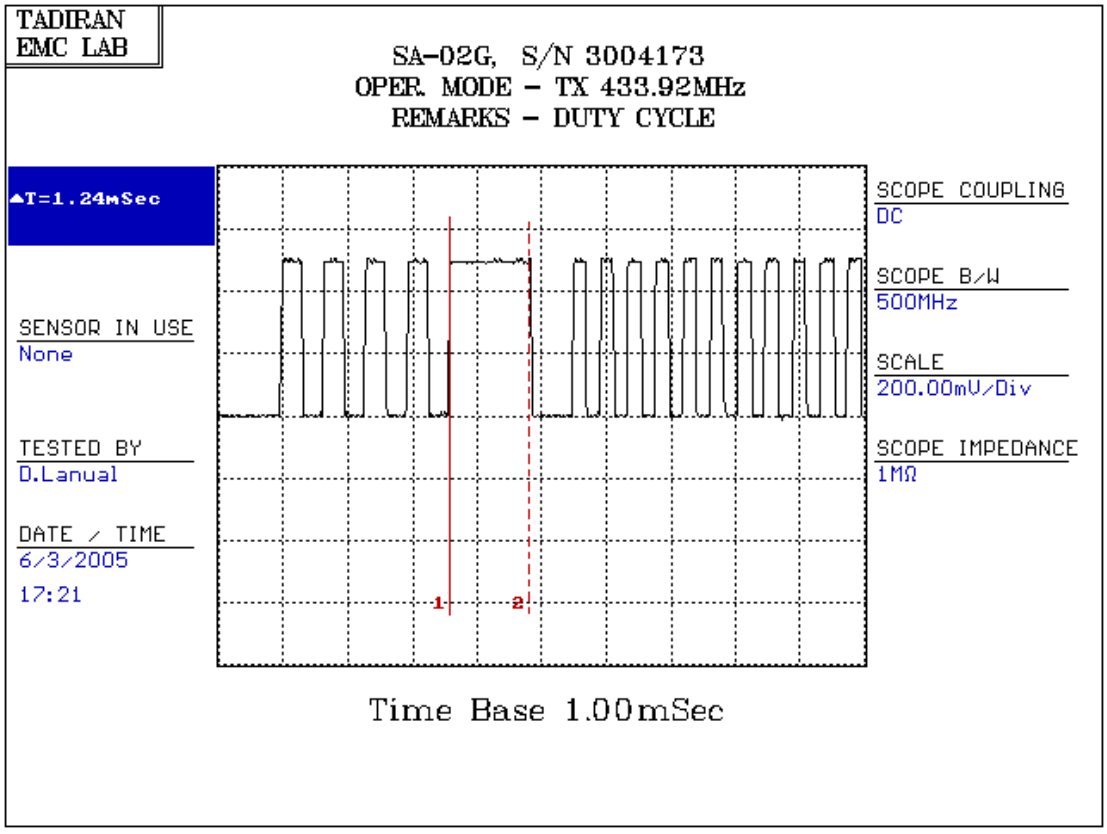


Plot 11 Duty Cycle

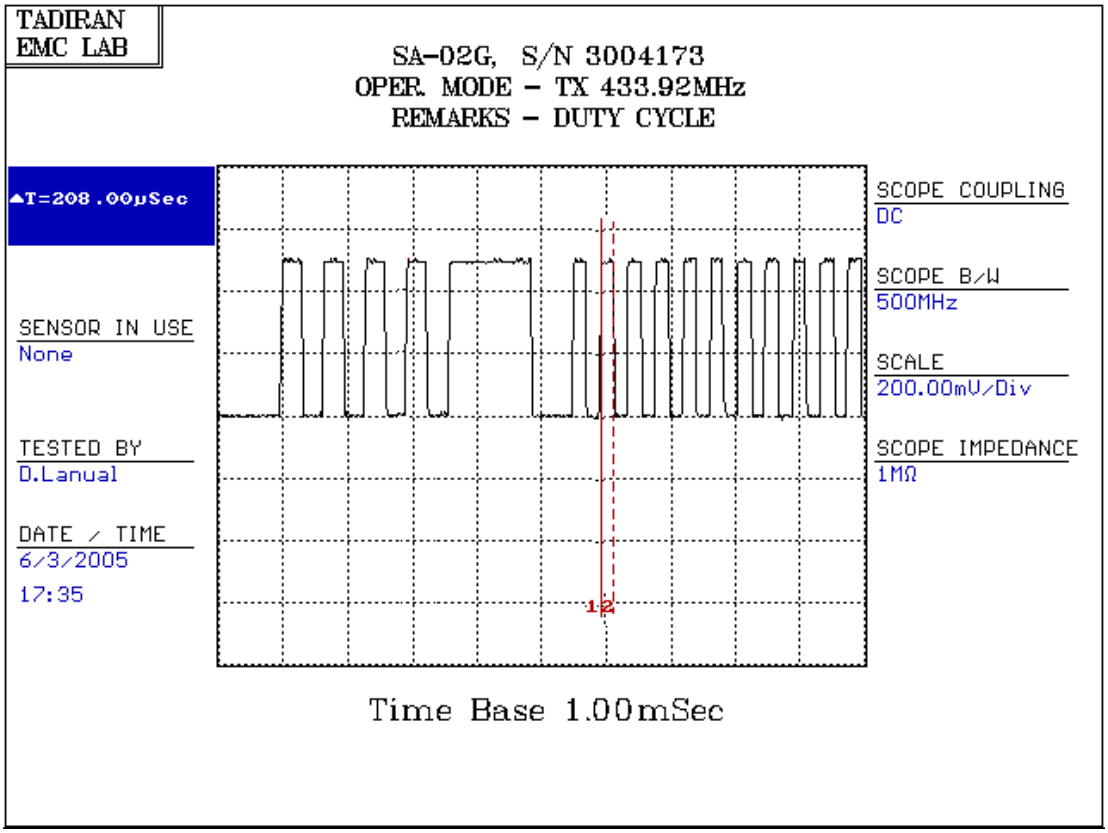
TX/ON=4X312µs+1248µs+43x208µs+2x40µs=11.52msec
Average Factor=20log(TXON/100)
20log11.52/100=-18.7



Plot 12 Duty Cycle



Plot 13 Duty Cycle



Plot 14 Duty Cycle

9 CORRECTION FACTORS

DOUBLE RIDGE HORN Model 3105 S/N:00-50C2-1C-C468 2052 Antenna Factor

Frequency (MHz)	Ant. Factor (db/m)
1000	24.4
2000	26.2
3000	30
4000	32.6
5000	33.8
6000	34.9
7000	36.2
8000	36.9
9000	37.8
10000	38.4
11000	39.1
12000	40.1
13000	42
14000	40.6
15000	39.3
16000	40.3

Antenna Factor for broadband antenna model BTA-L S/N:00-50C2-1C-C468 980045L

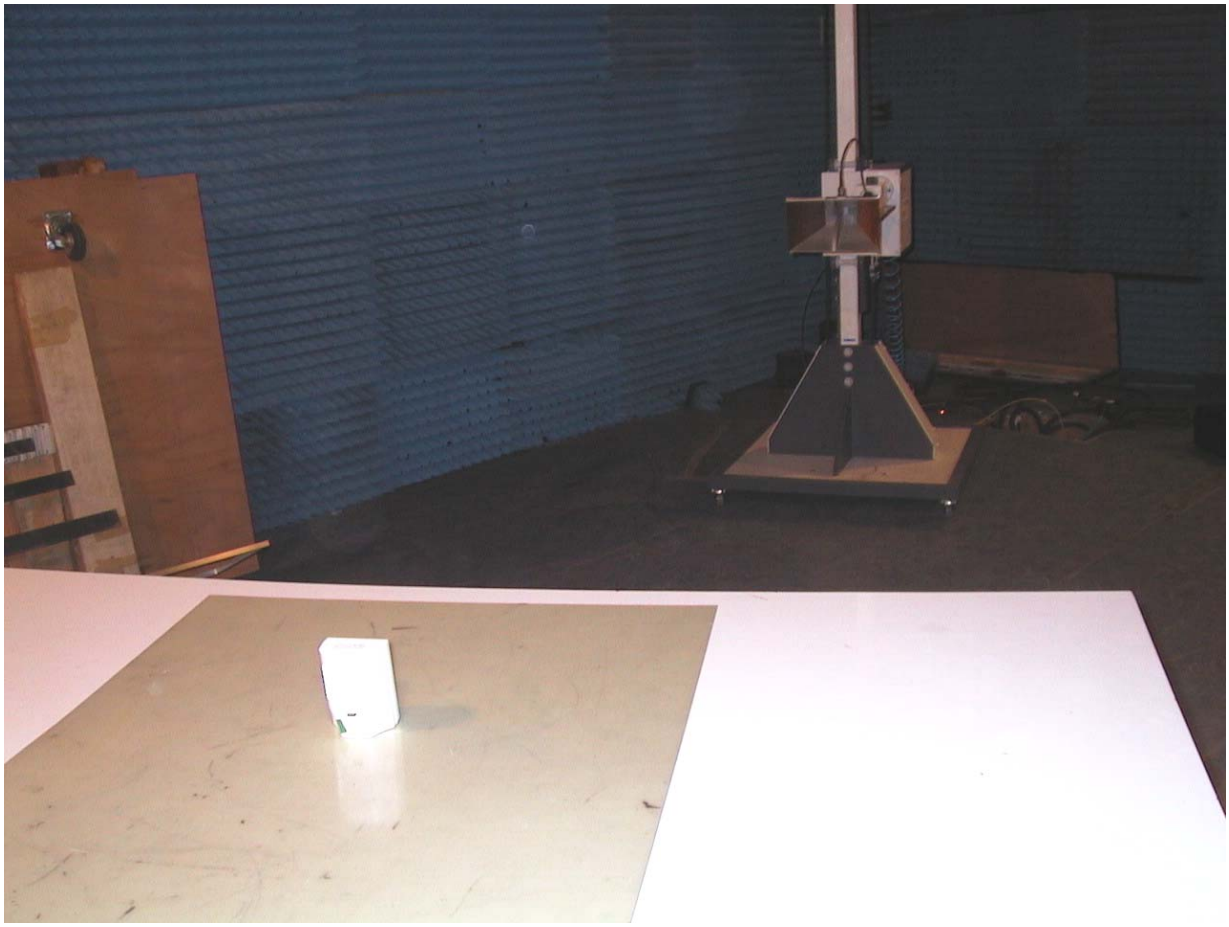
Frequency (KHz)	Ant. Factor (db/m)	Frequency (KHz)	Ant. Factor (db/m)
30	19.05	300	14.35
32	19.13	310	14.28
34	18.74	320	14.43
36	18.03	330	14.13
38	16.61	340	14.48
40	15.44	350	14.89
45	13.66	360	15.12
50	11.52	370	15.70
55	10.04	380	15.78
60	7.68	390	16.22
65	6.11	400	16,45
70	5.47	425	16.99
75	5.98	450	17.59
80	6.86	475	17.28
85	7.20	500	17.69
90	7.47	525	18.91
95	7.23	550	19.06
100	7.20	575	18.20
105	7.30	600	18.87
110	7.37	625	18.81
115	7.02	650	19.64
120	6.82	675	19.92
125	7.05	700	20.66
130	7.83	725	21.08
135	9.61	750	21.53
140	7.93	775	22.39
145	8.03	800	22.66
150	8.29	825	22.87
160	8.72	850	22.65
170	9.18	875	23.12
180	9.05	900	23.70
190	9.80	925	23.40
200	10.61	950	23.43
210	10.34	975	23.30
220	11.21	1000	24.02
230	11.69		
240	11.62		
250	11.85		
260	12.45		
270	13.16		
280	13.48		
290	13.74		

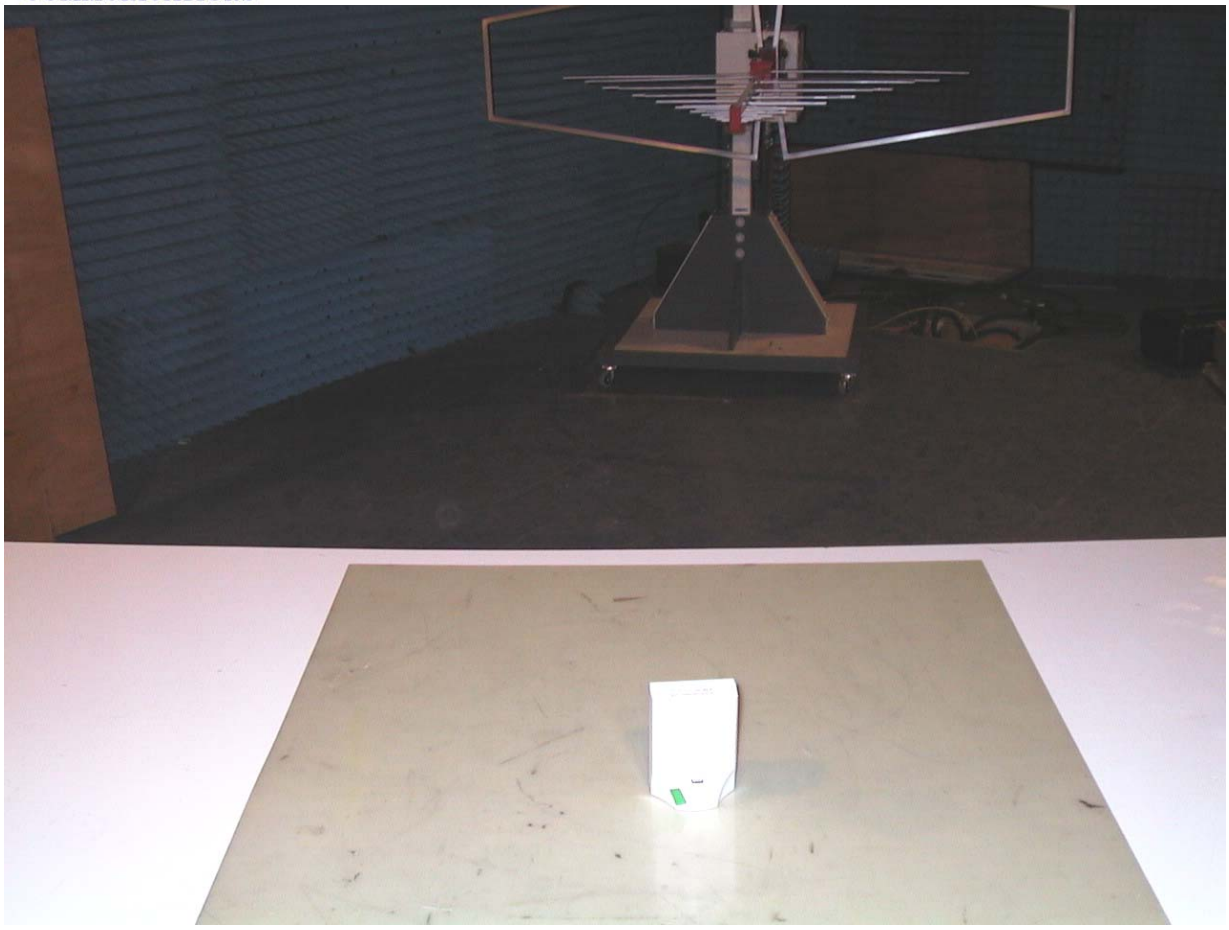
10 ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are applicable in this document

BW	Bandwidth
R.BW	Resolution Bandwidth
V.BW	Video Bandwidth
db	Decibel
EMI	Electromagnetic interference
E.U.T	Equipment under test
LISN	Line impedance stabilization network
S/N	Serial number
QP	Quasi peak
PK	Peak

11 PHOTOS





Rosslare SA-01- V2
Wireless PIR
ØP-ALM211-V2
Panasonic
CR123A