

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**Security Wireless Sensor**

**Model Name: Security RF-001**

**Brand Name: OKTC**

**FCC ID: Q7LKAROZRF-001**

**REPORT NO: 030070-R-ID**

**ISSUE DATE: May 26, 2003**

*Prepared for*

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C&C Laboratory, Co., Ltd.**



**VERIFICATION OF COMPLIANCE**

<b>Applicant:</b>	Omni Key Technology Corp. No. 74, Shanghai Rd., Chiayi City, Taiwan, R.O.C.
<b>Product Description:</b>	Security Wireless Sensor
<b>Brand Name:</b>	OKTC
<b>Model No.:</b>	Security RF-001
<b>Serial Number:</b>	N/A
<b>File Number:</b>	030070-R-ID
<b>Date of test:</b>	May 16 ~ 19, 2003

**We hereby certify that:**

The above equipment was tested by C&C Laboratory Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (1992) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.231.

The test results of this report relate only to the tested sample identified in this report.

**Approved By**

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**Jonson Lee / Director****C&C Laboratory Co., Ltd.****Review By**

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**Susan Su / Section Manager****C&C Laboratory Co., Ltd.**



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## 1. GENERAL INFORMATION

### 1.1 Product Description

The Omni Key Technology Corp. Model: Security RF-001 (referred to as the EUT in this report) is a Security Wireless Sensor (TX). It offers wireless remote control, ideal for use in vehicle security system to activate the function of center door lock control system and car searching except the alarm system.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 433.92 MHz
- B). Modulation type: Pulse Modulation
- C). Antenna Designation: Non-User Replaceable (Fixed)
- D). Transmitting Time: Periodic  $\leq$  2 seconds
- E). Receiver type: Super heterodyne

### 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: Q7LKAROZRF-001 filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules. The composite system (digital device)if any is compliance with Subpart B is authorized under a DoC procedure.

### 1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 16 requirements.

### 1.5 Special Accessories

Not available for this EUT intended for grant.

### 1.6 Equipment Modifications

Not available for this EUT intended for grant.



## 2. SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The EUT (Transmitter) was operated in the normal operating mode to fix the Tx frequency that was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.



## 2.4 Limitation

### (1) Conducted Emission (Not applicable in this report)

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

**Note**

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### (2) Radiated Emission

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
40.66 - 40.70	67.04	2,250	47.04	225
70 - 130	61.94	1,250	41.94	125
130 - 174	* 61.94 - 71.48	* 1,250 - 3,750	* 41.94 - 51.48	* 125 - 375
174 - 260	71.48	3,750	51.48	375
260 - 470	* 71.48 - 81.94	* 3,750 - 12,500	* 51.48 - 61.94	* 375 - 1,250
above 470	81.94	12,500	61.94	1,250



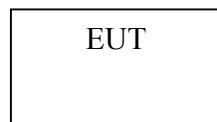
\* Linear Interpolations.

Remark:

1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of  $\xi$  15.205
4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of  $\xi$  15.205, then the general radiated emission limits in  $\xi$  15.209 apply.

## 2.4 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**



**Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.	N/A	N/A	N/A	N/A	N/A	N/A	N/A



### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§ 15.207	Conducted Emission	N/A
§ 15.231	Radiated Emission	Compliant
§ 15.231	20dB Bandwidth	Compliant
§ 15.35	Duty Cycle Test (Pulse Modulation)	

### 4. DESCRIPTION OF TEST MODES

The EUT (Security Wireless Sensor ) has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

The Frequency 433.92MHz is chosen at X, Y and Z axis for pre-test and the worst case Y axis was reported.



## 5. AC POWER LINE CONDUCTED EMISSION TEST

**(Not applicable in this report)**

### 5.1 EUT Setup

**(Block Diagram of Configuration)**

### 5.2 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.3 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	847793/012	12/21/2002	12/20/2003
LISN	R&S	ESH2-Z5	843285/010	12/16/2002	12/15/2003
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003

### 5.4 Measurement Result

N/A



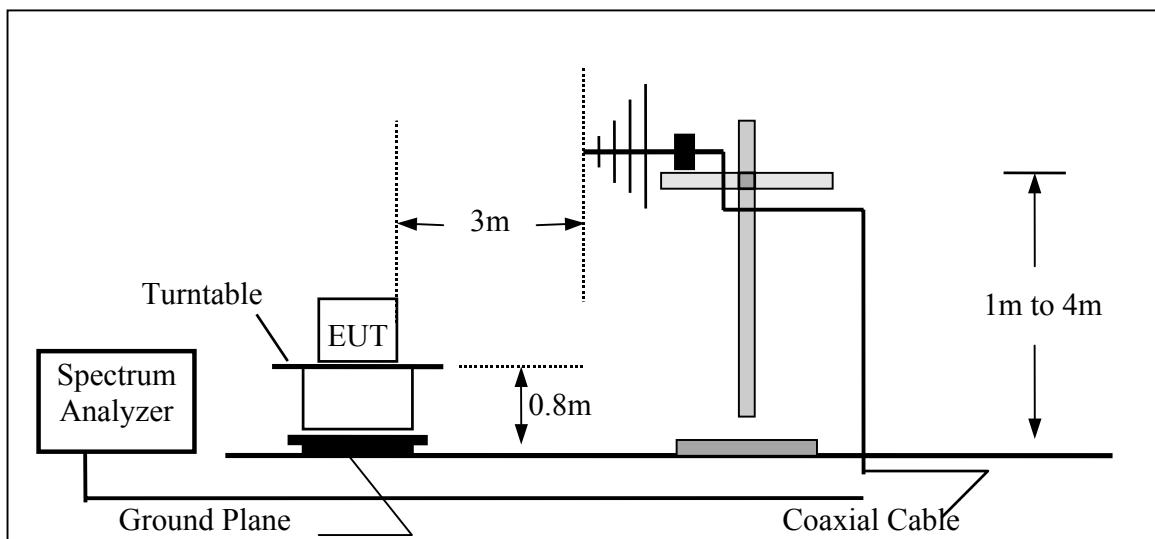
## 6. RADIATED EMISSION TEST

### 6.1 Measurement Procedure

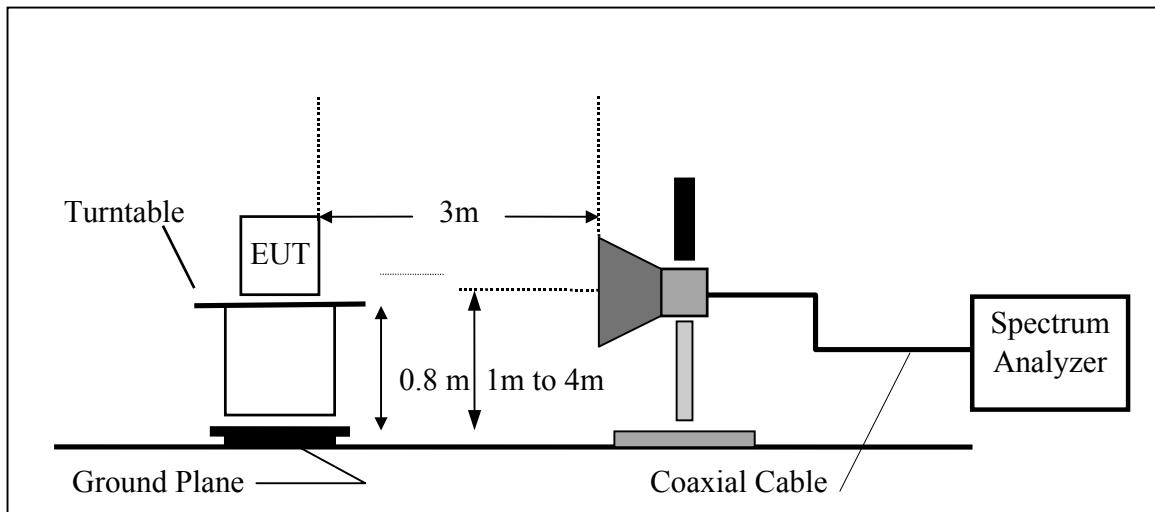
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

## 6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz





### 6.3 Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3261A	N/A	N/A	N/A
EMI Test Receiver	R&S	ESVS20	838804/004	01/09/2003	01/08/2004
Pre-Amplifier	HP	8447D	2944A09173	03/03/2003	03/02/2004
Bilog Antenna	SCHWAZBECK	VULB9163	145	07/06/2002	07/05/2003
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	09/07/2002	09/06/2003
Spectrum Analyzer	ROHDE & SCHWARZ	FSP30	100112	06/29/2002	06/28/2003
Horn antenna	Schwarzbeck	BBHA 9120	D210	2/24/2003	2/23/2004
Pre-Amplifier	HP	8449B	3008B00965	10/01/2002	10/02/2003

### 6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude		AG = Amplifier Gain
AF = Antenna Factor		

### 6.5 Measurement Result

Refer to attach tabular data sheets.

#### NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.



## Radiated Spurious Emission Measurement Result

Operation Mode: Transmitting Y Mode Test Date: May 16, 2003

Temperature: 23°C Test By: Rico

Humidity: 65% Pol: Ver./Hor

Freq. (MHz)	F/S	Ant.Pol.	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Duty Cycles CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Margin (AV)
434.400	F	V	32.90	20.34	-11.48	53.24	41.76	99.00	79.00	-37.24	(AV)
868.400	S	V	6.39	27.60	-11.48	33.99	22.51	79.00	59.00	-36.49	(AV)
1301.160	S	V	---	---	---	---	---	74.00	54.00	*	---
1734.880	S	V	---	---	---	---	---	79.00	59.00	---	---
2168.600	S	V	---	---	---	---	---	79.00	59.00	---	---
2602.320	S	V	---	---	---	---	---	79.00	59.00	---	---
3036.040	S	V	---	---	---	---	---	79.00	59.00	---	---
3469.760	S	V	---	---	---	---	---	79.00	59.00	---	---
3903.480	S	V	---	---	---	---	---	74.00	54.00	*	---
4337.200	S	V	---	---	---	---	---	74.00	54.00	*	---

### Remark :

- (1) + F/S F : denotes Fundamental Frequency ; S : denotes Spurious Frequency
- (2) EUT Orthogonal Axes : X, Z denotes Laid on Table ; Y denotes Vertical Stand .
- (3) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 433.92 MHz .
- (4) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) \* denotes spurious frequency which falls within the Restricted Bands specified in provision of  $\xi 15.205$ , then the general radiated emission limits in  $\xi 15.209$  apply.
- (6) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 5GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms



## Radiated Spurious Emission Measurement Result

Operation Mode: Transmitting Y Mode Test Date: May 16, 2003

Temperature: 23°C Test By: Rico

Humidity: 65% Pol: Ver./Hor

Freq. (MHz)	F/S	Ant.Pol.	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Duty Cycles	Peak (dBuV/m)	AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
433.920	F	H	13.95	20.34	-11.48	34.29	22.81	99.00	79.00	-56.19 (AV)
867.440	S	H	---	---	---	---	---	79.00	59.00	---
1301.160	S	H	---	---	---	---	---	74.00	54.00	*
1734.880	S	H	---	---	---	---	---	79.00	59.00	---
2168.600	S	H	---	---	---	---	---	79.00	59.00	---
2602.320	S	H	---	---	---	---	---	79.00	59.00	---
3036.040	S	H	---	---	---	---	---	79.00	59.00	---
3469.760	S	H	---	---	---	---	---	79.00	59.00	---
3903.480	S	H	---	---	---	---	---	74.00	54.00	*
4337.200	S	H	---	---	---	---	---	74.00	54.00	*

Remark :

- (1) + F/S F : denotes Fundamental Frequency ; S : denotes Spurious Frequency
- (2) EUT Orthogonal Axes : X, Z denotes Laid on Table ; Y denotes Vertical Stand .
- (3) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 433.92 MHz .
- (4) Datas of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) \* denotes spurious frequency which falls within the Restricted Bands specified in provision of  $\xi$ 15.205, then the general radiated emission limits in  $\xi$  15.209 apply.
- (6) Spectrum Setting : 30MHz – 1000MHz , RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms. 1GHz- 5GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms



## 7. Occupied Bandwidth

### 7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT normal operating mode.
3. Set SPA Center Frequency = fundamental frequency , RBW,VBW= 100KHz, Span = 1MHz.
4. Set SPA Max hold. Mark peak, -20dB

### 7.2 Test Setup:

Same as section 6.2 of Radiated Emission Measurement.

### 7.3 Measurement Equipment Used:

Same as section 6.3 of Radiated Emission Measurement.

### 7.4 Measurement Result

The center frequency  $f_c$  is **433.92Mhz (point 1)**, according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at-20dB should be calculated as following:

$$433.92 \times 0.0025 = 1.0848(\text{MHz})$$

So, the Upper/Lower frequencies should be specified as :

$$f(U) = f_c + \Delta f/2 = 433.92 + 0.5424 = 434.46(\text{MHz})$$

$$f(L) = f_c - \Delta f/2 = 433.92 - 0.5424 = 433.377 (\text{MHz})$$

The measured frequencies at -20dB Bandwidth of Fundamental are  $f$  (point 2) and  $f$  (point 3) as shown in the spectrum graphic above. Either  $f$  (point 4) or  $f$ (point 2) located within the band of frequency between  $f_{(L)}=433.377$  MHz and  $f_{(U)}=434.46$  MHz. So, it is compliance with the requirements.

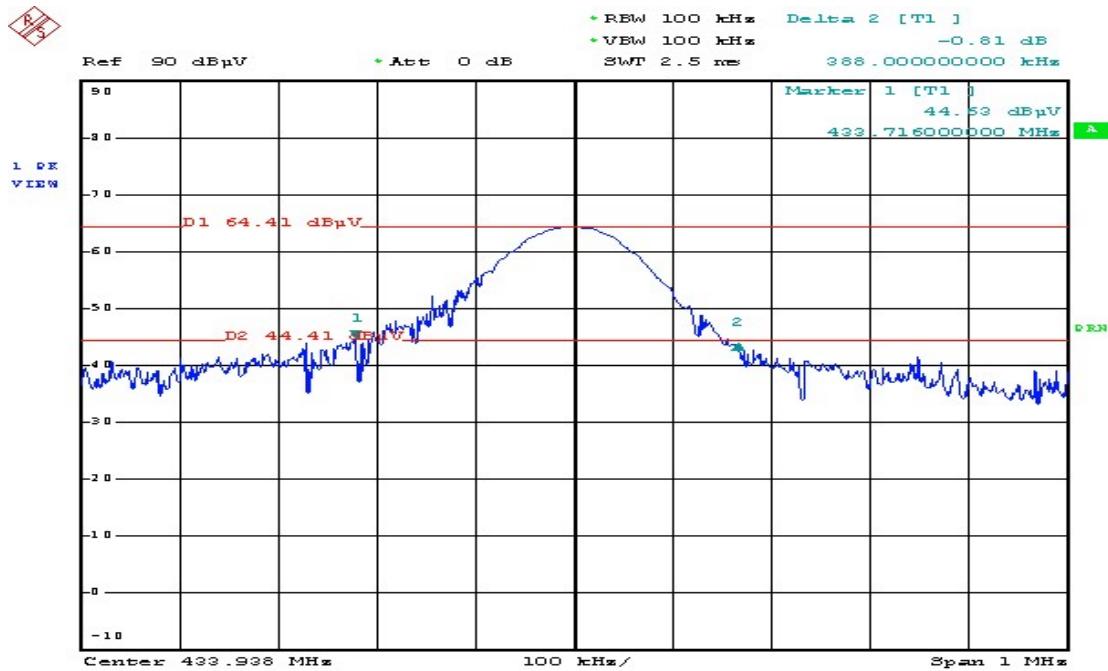
Measurement Result:

Center Frequency = 433.92 MHz

Lower Frequency = 433.716 MHz

Upper Frequency= 434.104 MHz

## 20dB Band Width Test Data



Date: 21.MAY.2003 11:51:49



## **8. Duty Cycle Measurement (Pulse Modulation)**

### **8.1 Measurement Procedure**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT normal operating mode.
3. Set SPA Center Frequency = fundamental frequency , RBW,VBW= 100KHz, Span =0 Hz. Adjacent sweep.
4. Set SPA View. Mark delta.

### **8.2 Test Setup**

Same as section 6.2 of Radiated Emission Measurement.

### **8.3 Measurement Equipment Used:**

Same as section 6.3 of Radiated Emission Measurement.

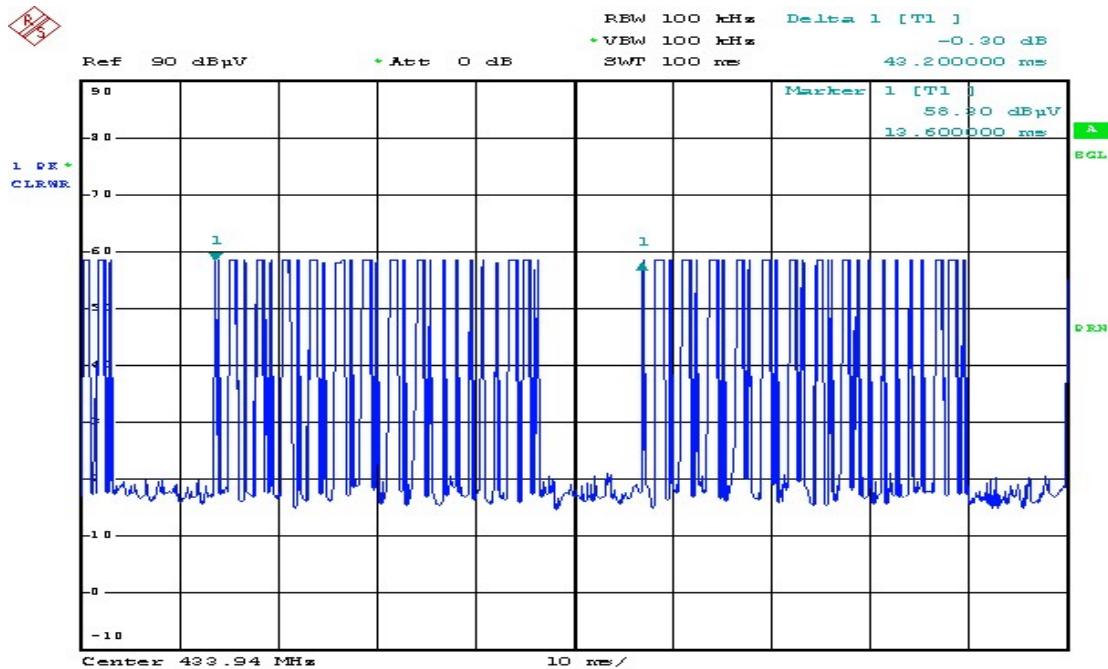
### **8.4 Test Results:**

$$T_p = 43.2 \text{ ms}$$

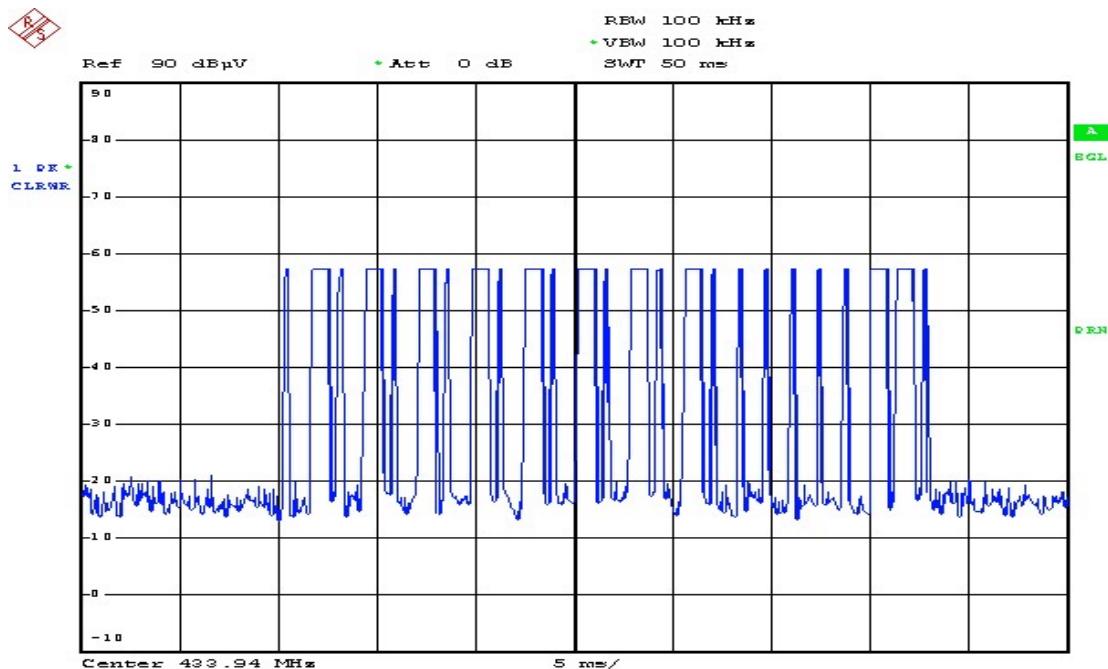
$$T_{on} = 0.195 * 15 + 0.860 * 10 = 11.525 \text{ (ms)}$$

$$\begin{aligned} \text{Factor} &= 20 * \log(T_{on} / T_p) = 20 * \log(11.525 / 43.2) \\ &= -11.48 \text{ dB} \end{aligned}$$

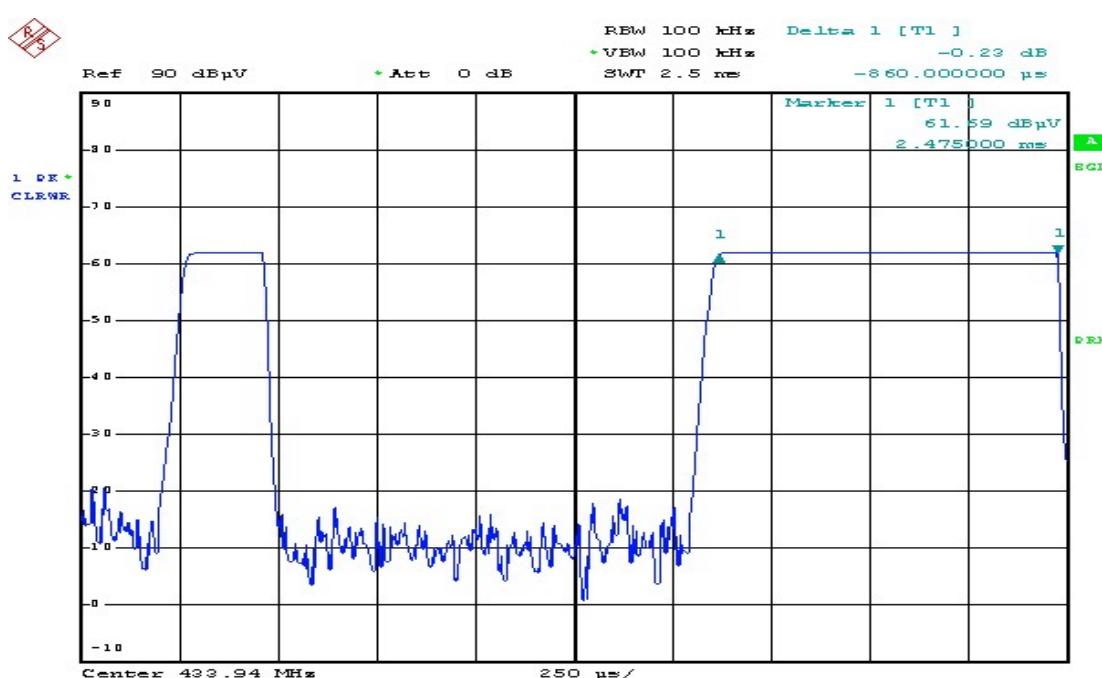
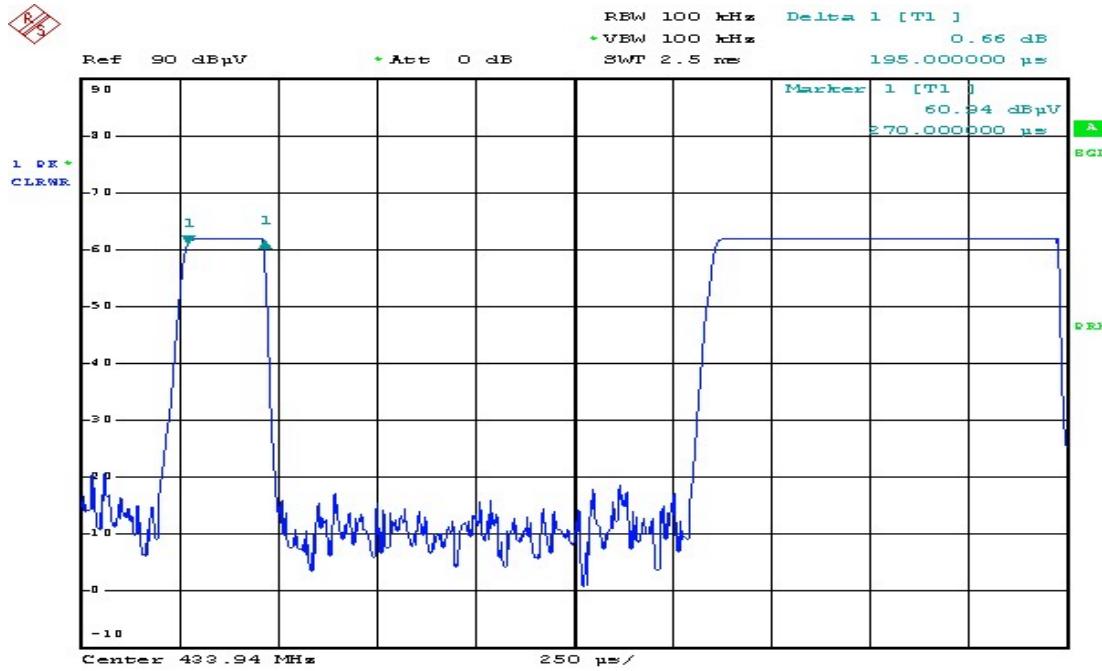
## Duty cycle test



Date: 26.MAY.2003 04:11:24



Date: 26.MAY.2003 04:09:50



Date: 26.MAY.2003 04:08:19