



**Test Report:** 5W38290

**Applicant:** Kolombo Technologies Ltd.  
255 rue Fortin, Suite 80  
Vanier, Quebec  
G1M 3M2

**Apparatus:** K1-KC300

**FCC ID:** RYAK1KC3001

**In Accordance With:** FCC Part 15 Subpart C, 15.231  
Periodic operation in the band 40.66-40.70MHz and  
above 70 MHz.

**Tested By:** Nemko Canada Inc.  
303 River Road  
Ottawa, Ontario  
K1V 1H2

**Authorized By:**

A handwritten signature in blue ink, appearing to read 'Sim Jagpal'.

Sim Jagpal, Resource Manager

**Date:** 17 March 2005

**Total Number of Pages:** 16

## Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

<b>Apparatus Assessed:</b>	K1-KC300
<b>Specification:</b>	FCC Part 15 Subpart C, 15.231
<b>Compliance Status:</b>	Complies
<b>Exclusions:</b>	None
<b>Non-compliances:</b>	None
<b>Report Release History:</b>	Original Release

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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## **Section 1 : Equipment Under Test**

### **1.1 Product Identification**

The Equipment Under Test was identified as follows:

K1-KC300 Keychain

### **1.2 Samples Submitted for Assessment**

The following samples of the apparatus have been submitted for type assessment:

<b>Sample No.</b>	<b>Description</b>	<b>Serial No.</b>
1	MOD-DI KEYCHAIN	_____
2	MOD-DI KEYCHAIN	_____

The first samples were received on: January 10, 2005

### **1.3 Theory of Operation**

The keychain is used as part of a car security system. When used with the Kolombo K1000 receiver the unit becomes an alarm system and is used to deactivate the ability to start a car.

## **1.4 Technical Specifications of the EUT**

<b>Manufacturer:</b>	M2S Electronics
<b>Operating Frequency:</b>	433.92MHz (Fixed)
<b>Emission Designator:</b>	P1D
<b>Fundamental Field Strength (distance):</b>	64.0dBuV/m @ 3m
<b>Modulation:</b>	ASK modulation
<b>Antenna Data:</b>	Integral Antenna
<b>Power Source:</b>	One “CR 2032 – 3 Volts” Battery

## Section 2 : Test Conditions

### 2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.231

Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

### 2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

### 2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

### 2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Hewlett-Packard	8564E	FA001367	June 28/04	June 28/05
Dipole Antenna Set	EMCO #1	3121C	FA000814	April 21/04	April 21/05
Log Periodic Antenna #1	EMCO	LPA-25	FA000477	Aug. 26/04	Aug. 26/05
Horn Antenna #2	EMCO	3115	FA000825	Dec. 14/04	Dec. 14/05
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	June 18/04	June 18/05
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	June 18/04	June 18/05
4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	June 18/04	June 18/05

## **Section 3 : Observations**

### **3.1 Modifications Performed During Assessment**

No modifications were performed during assessment.

### **3.2 Record Of Technical Judgements**

No technical judgements were made during the assessment.

### **3.3 EUT Parameters Affecting Compliance**

The user of the apparatus could not alter parameters that would affect compliance.

### **3.4 Test Deleted**

No Tests were deleted from this assessment.

## **Section 4 : Results Summary**

This section contains the following:

FCC Part 15 Subpart C : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N      No : not applicable / not relevant.
- Y      Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T    Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.



**4.1 FCC Part 15 Subpart C : Test Results**

Part 15	Test Description	Required	Result
15.207(a)	Powerline Conducted Emissions	N	
15.209(a)	Radiated Emissions within Restricted Bands	Y	Pass
15.231(a)(1)	Manually operated transmitter	Y	Pass
15.231(a)(2)	Automatically activated transmitter	N	
15.231(a)(3)	Periodic transmissions at regular predetermined intervals	N	
15.231(a)(4)	Radiators used in cases of emergency	N	
15.231(a)(5)	Set-up information for security systems	N	
15.231(b)	Radiated Emissions	Y	PASS
15.231(c)	20dB Bandwidth	Y	PASS
15.231(d)	Devices operating within the frequency band 40.66-40.70 MHz	N	
15.231(e)	Radiated emissions for Periodic radiators	N	

## Notes:

- 1) The EUT is battery powered.
- 2) The EUT does not operate in the 40.66-40.70MHz range.

## Appendix A : Test Results

### Criteria: Clause 15.209(a) Radiated Emissions within Restricted Bands

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400F (kHz)	300
0.490-1.705	24000F (kHz)	30
1.705-30.0	30	30
30-88	1001	3
88-216	1502	3
216-960	2003	3
Above 960	500	3

### Test Conditions:

<b>Sample Number:</b>	2	<b>Temperature:</b>	12
<b>Date:</b>	February 4, 2005	<b>Humidity:</b>	48
<b>Modification State:</b>	0	<b>Tester:</b>	Jason Nixon
		<b>Laboratory:</b>	OATS

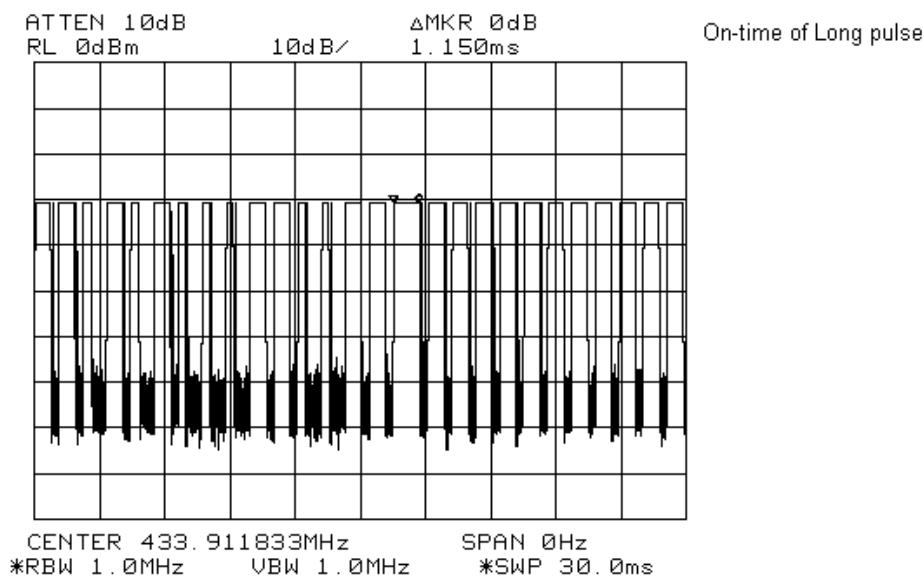
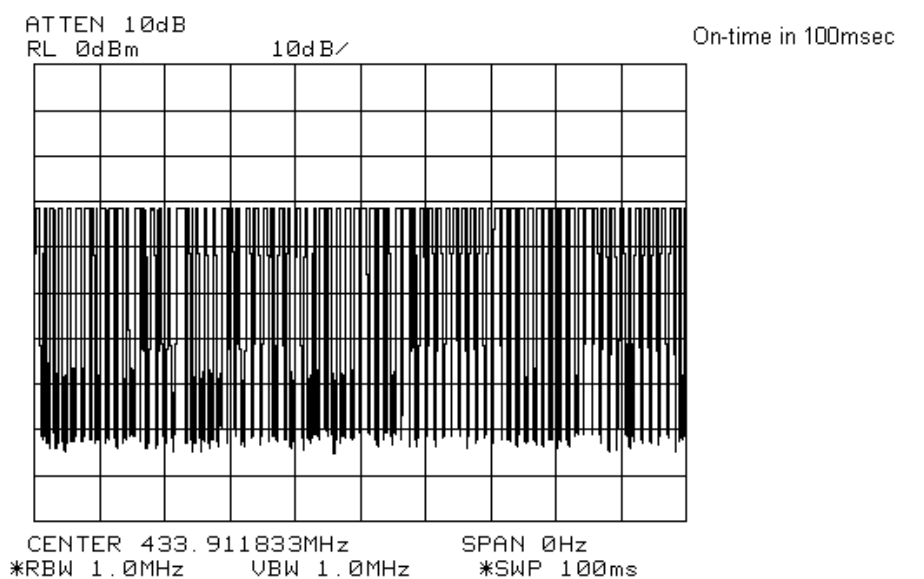
**Test Results:** See Attached Table for Results

### Additional Observations:

- 1) The Spectrum was searched from 30MHz to the 10<sup>th</sup> Harmonic.
- 2) These results apply to emissions found in the Restricted bands defined in FCC Part 15 Subpart C, 15.205.
- 3) The EUT was measured on three orthogonal axis.
- 4) Spectrum Analyzer settings were 100kHz RBW/VBW for emissions below 1GHz and 1MHz RBW/VBW for emissions above 1GHz.

Frequency (MHz)		Antenna	Polarity	RCVD Signal (dBuV)	Ant. Factor (dB)	Amp. Gain / Cable Loss (dB)	Duty Cycle Corr.	Distance Correction	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1301.7200	Horn2	V	52.7	25.4	43.3	0.9	-	34.8	74.0	39.2	Peak
									33.9	54.0	20.1	Average
2	1301.7200	Horn2	H	54.7	25.3	43.3	0.9	-	36.7	74.0	37.3	Peak
									35.8	54.0	18.2	Average
Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole												
Note 2: Positive Peak detector used												
Emission Level (dBuV/m) = RCVD Signal + Ant. Factor – Amp gain/cable loss – Distance Correction(-duty cycle corr. for average)												

# Duty Cycle:



$$\text{Duty cycle} = 20\log((1.15\text{msec} \times 78)/100\text{msec}) = -0.9\text{dB}$$

**Criteria: Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation**

The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

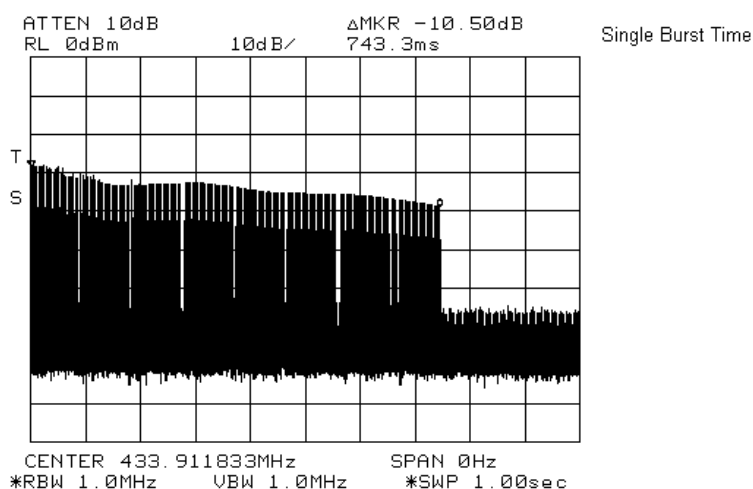
- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
- (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.
- (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

**Test Conditions:**

<b>Sample Number:</b>	1	<b>Temperature:</b>	23
<b>Date:</b>	March 3, 2005	<b>Humidity:</b>	11
<b>Modification State:</b>	0	<b>Tester:</b>	Jason Nixon
		<b>Laboratory:</b>	Wireless

**Test Results:**

The EUT is a manually operated device. One press of a key produces the following transmission.



**Criteria: Clause 15.231(b) Radiated Emissions**

In addition to the provisions of 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750	125 to 375
174-260	3,750	375
260-470	3,750 to 12,500	375 to 1,250
Above 470	12,500	1,250

**Test Conditions:**

<b>Sample Number:</b>	2	<b>Temperature:</b>	12
<b>Date:</b>	February 4, 2005	<b>Humidity:</b>	48
<b>Modification State:</b>	0	<b>Tester:</b>	Jason Nixon
		<b>Laboratory:</b>	OATS

**Test Results:** See Attached Table for Results

**Additional Observations:**

- 1) The Spectrum was searched from 30MHz to the 10<sup>th</sup> Harmonic.
- 2) The EUT was measured on three orthogonal axis.
- 3) Spectrum Analyzer settings were 100kHz RBW/VBW for emissions below 1GHz and 1MHz RBW/VBW for emissions above 1GHz.

Freq. (MHz)	Ant	Pol. V/H	RCVD Signal (dBμV)	Ant. Factor (dB)	Amp. Gain (dB)	Duty Cycle Corr. (dB)	Cable Loss (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)
433.9200	ED4	V	40.7	21.6	N/A	-0.9	2.7	64.0	80.8	16.8
433.9200	ED4	H	38.8	21.6	N/A	-0.9	2.7	62.2	80.8	18.6
867.8200	LP1	V	30.8	22.1	N/A	-0.9	3.9	55.9	60.8	4.9
867.8200	LP1	H	27.8	23.1	N/A	-0.9	3.9	53.9	60.8	6.9
1735.6200	Horn2	V	66.3	27.5	46.6	-0.9	4.2	50.5	60.8	10.3
1735.6200	Horn2	H	66.0	27.6	46.6	-0.9	4.2	50.3	60.8	10.5
2169.5200	Horn2	V	62.8	28.3	55.3	-0.9	5.1	39.9	60.8	20.9
2169.5200	Horn2	H	nd	28.3	55.3	-0.9	5.1	-	60.8	-
2603.4200	Horn2	V	72.5	29.8	56.5	-0.9	8.6	53.5	60.8	7.3
2603.4200	Horn2	H	71.2	29.8	56.5	-0.9	8.6	52.1	60.8	8.7

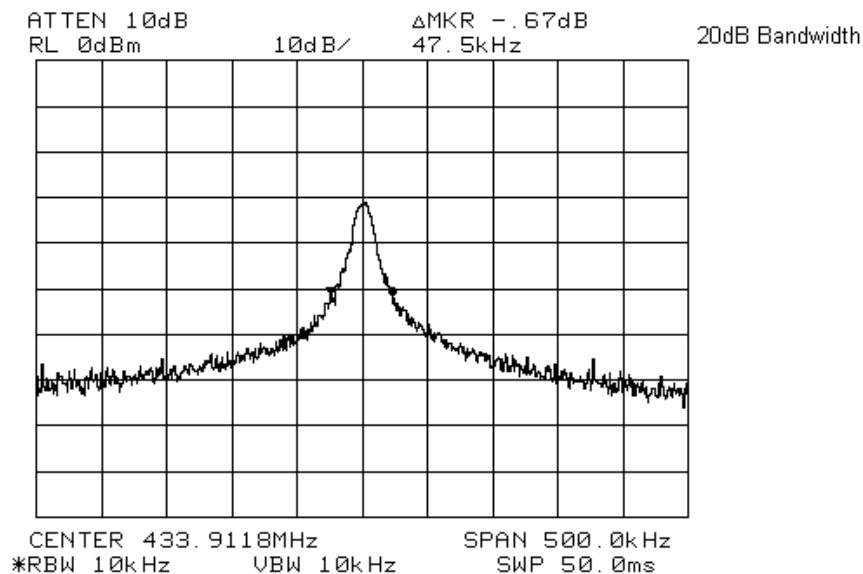
Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole  
Note 2: Positive Peak detector used

**Criteria: Clause 15.231(c) 20dB Bandwidth**

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

**Test Conditions:**

<b>Sample Number:</b>	2	<b>Temperature:</b>	23
<b>Date:</b>	March 3, 2005	<b>Humidity:</b>	11
<b>Modification State:</b>	0	<b>Tester:</b>	Jason Nixon
		<b>Laboratory:</b>	Wireless

**Test Results:****20dB Bandwidth:**

## **Appendix B : Setup Photographs**

### **Spurious Emissions Setup:**



## Appendix C : Block Diagram of Test Setups

### Test Site For Radiated Emissions

