

DATE: 13 November 2008

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

FCC Radio Test Report

for

Visonic Ltd.

Equipment under test:

Fully Wireless Indoor Siren

MCS-720

Written by: *E. Ever*
E. Ever, Documentation

Approved by: *E. Ever*
E. Ever, Test Engineer

Approved by: *I. Raz*
I. Raz, EMC Laboratory Manager

This report must not be reproduced, except in full, without the written permission of I.T.L. (Product Testing) Ltd.

This report relates only to items tested.

Measurement/Technical Report for
Visonic Ltd.
Fully Wireless Indoor Siren

MCS-720

FCC ID: WP3MCS720

IC ID: 1467C-MCS720

17 November 2008

This report concerns: Original Grant: x
 Class I change:
 Class II change:

Equipment type: Part 15 Security/Remote Control Transceiver

47CFR15 Section 15.231 (a-d)

Measurement procedure used is ANSI C63.4-2003.

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")
Arik Elshtein
Visonic Ltd.
Tel Aviv
Habarzel 24
Israel 69710
Tel: +936-03-6456789
e-mail: aelshtein@visonic.com

TABLE OF CONTENTS

1.	GENERAL INFORMATION-----	4
1.1	Administrative Information.....	4
1.2	List of Accreditations	5
1.3	Product Description	6
1.4	Test Methodology	6
1.5	Test Facility	6
1.6	Measurement Uncertainty	6
2.	PRODUCT LABELING -----	7
3.	SYSTEM TEST CONFIGURATION-----	8
3.1	Justification.....	8
3.2	EUT Exercise Software	8
3.3	Special Accessories	8
3.4	Equipment Modifications	8
3.5	Configuration of Tested System.....	8
4.	TEST SET-UP PHOTOS-----	9
5.	PERIODIC OPERATION -----	9
5.1	Specification	10
5.2	Requirements	10
5.3	Results.....	10
5.1	Test Instrumentation Used	12
6.	FIELD STRENGTH OF FUNDAMENTAL -----	13
6.1	Test Specification	13
6.2	Test Procedure.....	13
6.3	Measured Data.....	13
6.4	Test Instrumentation Used	17
7.	RADIATED EMISSION, 9 KHZ – 30 MHZ -----	18
7.1	Test Specification	18
7.2	Test Procedure.....	18
7.3	Measured Data.....	18
7.4	Test Instrumentation Used	19
7.5	Field Strength Calculation	20
8.	SPURIOUS RADIATED EMISSION -----	21
8.1	Test Specification	21
8.2	Test Procedure.....	21
8.3	Test Data	22
8.4	Test Instrumentation Used	24
9.	BANDWIDTH -----	25
9.1	Test Specification	25
9.2	Test procedure	25
9.3	Results table.....	27
9.4	Test Equipment Used.....	28
10.	APPENDIX A – AVERAGE FACTOR CALCULATION -----	29
11.	APPENDIX B - CORRECTION FACTORS -----	30
11.1	Correction factors for CABLE.....	30
11.2	Correction factors for Amplifier 8447F 30M-1.3G GAIN	31
11.3	Correction factors for Bilog ANTENNA	32

1. General Information

1.1 Administrative Information

Manufacturer:	Visonic Ltd.
Manufacturer's Address:	Habarzel 24 Tel Aviv Israel 69710 Tel: +936-03-6456789 Fax: +936-03-6456788
Manufacturer's Representative:	Arik Elshtein
Equipment Under Test (E.U.T):	Fully Wireless Indoor Siren
Equipment Model No.:	MCS-720
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	19/10/2008
Start of Test:	28/10/2008
End of Test:	30/10/2008
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Lod, ISRAEL 71100
Test Specifications:	FCC Part 15 Sub-part B, 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 MCS-720 is a fully supervised wireless siren, for indoor use, that communicates with PowerMax Pro or PowerMaxComplete alarm systems. The MCS-720 is a fully supervised, 2-way communication device.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. 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 Lod, Israel. This site is a FCC listed test laboratory (FCC Registration No. 861911, date of listing August 22, 2006). I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission

The uncertainty for this test is ± 2 dB.

Radiated Emission

The Open Site complies with the ± 4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. 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

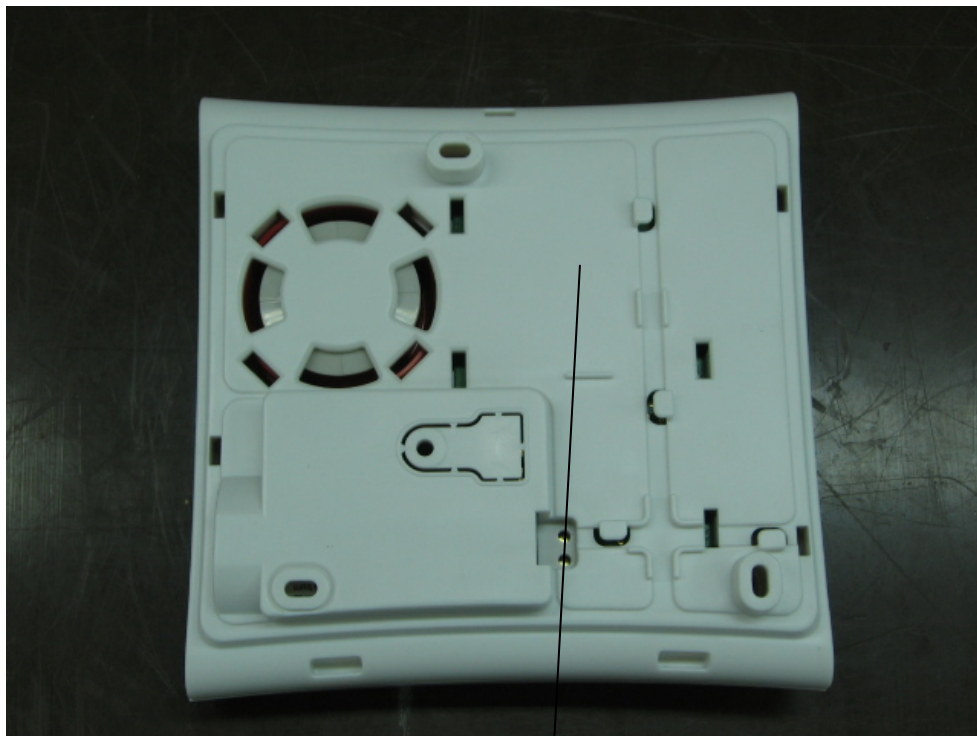


Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 *Justification*

The MCS-720 is a fully supervised wireless siren, for indoor use, that communicates with PowerMax Pro or PowerMaxComplete alarm systems. The MCS-720 is a fully supervised, 2-way communication device. It includes a receiver, to receive activation, commands from the alarm system, and a transmitter, to periodically transmit its status signal to the alarm system.

The product carrier field level was measured with the E.U.T. in the wall mounted orientation, per the customer installation instructions in the user manual.

3.2 *EUT Exercise Software*

Manufacturing software was used for the tests.

3.3 *Special Accessories*

No special accessories were needed.

3.4 *Equipment Modifications*

In order to pass the emissions requirements the following modifications were made to the unit's software.

1. Transmit power level is defined by PATABLE register value of RF IC CC1101.
2. PATABLE register value has been changed from 0x51 to 0x69 that decreases transmit power by 5 dB.

3.5 *Configuration of Tested System*

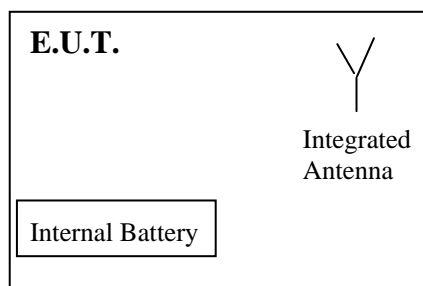


Figure 3. Configuration of Tested System

4. Test Set-up Photos



Figure 4. Emission Tests



Figure 5. Spurious Radiated Emission Setup

5. Periodic Operation

5.1 Specification

F.C.C., Part 15, Subpart C, Section 15.231(a)

5.2 Requirements

Requirement	Rationale	Verdict
Continuous transmissions are not permitted.	See plots in <i>Figure 6</i>	Complies
A manually operated transmitter shall be deactivated within not more than 5 seconds after releasing the switch.	See plots in <i>Figure 6</i>	Complies
An automatically operated transmitter shall cease operation within 5 seconds after activation.	N/A	Complies
Periodic transmissions at regular predetermined intervals are not permitted.	N/A	Complies
Polling or supervised transmissions to determine system integrity of transmitter used in security or safety applications shall not exceed more than 2 seconds per hour.	See plots in <i>Figure 6</i>	Complies

5.3 Results

JUDGEMENT: Passed

The EUT met the FCC Part 15, Subpart C, Section 15.231(a) specification requirements.

TEST PERSONNEL:

Tester Signature: *E. Ever*

Date: 16/11/2008

Typed/Printed Name: E. Ever

Periodic Operation

E.U.T Description Fully Wireless Indoor Siren
 Type MCS-720
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(a)

09:50:27 OCT 29, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKRΔ 175.00 msec
 -.20 dB

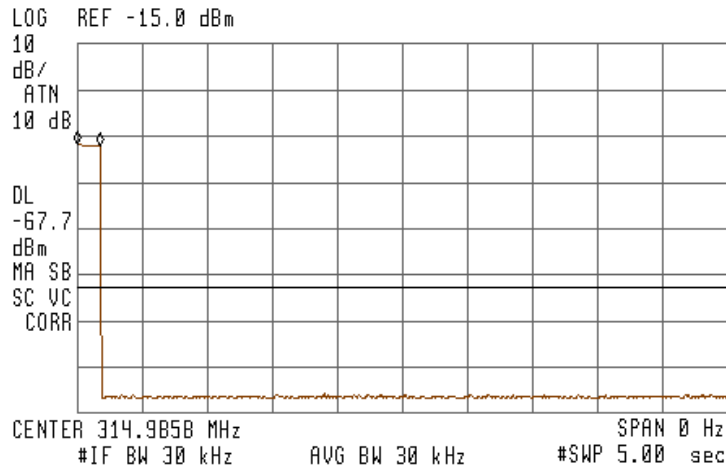


Figure 6. Self Test Switch Pulse Width

5.1 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	8546A	3650A00365	November 30, 2007	1 year
RF Section	HP	85460A	3650A00365	November 30, 2007	1 year

6. Field Strength of Fundamental

6.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.231(b)

6.2 Test Procedure

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

The E.U.T. was placed on a non-conductive table, 0.8 meters above the O.A.T.S. ground plane.

The EMI receiver was set to the E.U.T. Fundamental Frequency (315 MHz) and Peak Detection.

The turntable and antenna mast were adjusted for maximum level reading on the EMI receiver.

The measurement was performed for vertical and horizontal polarizations of the test antenna.

The average result is:

Peak Level(dB μ V/m) + E.U.T. Duty Cycle Factor, in 100msec time window (dB)

6.3 Measured Data

JUDGEMENT: Passed by 0.9 dB

The EUT met the FCC Part 15, Subpart C, Section 15.231(b) specification requirements.

The details of the highest emissions are given in *Figure 7* to *Figure 9*.

TEST PERSONNEL:

Tester Signature: *E. Ever* Date: 16/11/2008

Typed/Printed Name: E. Ever

Field Strength of Fundamental

E.U.T Description Fully Wireless Indoor Siren
 Type MCS-720
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal/Vertical

Test Distance: 3 meters

Detector: Peak

Freq.	Pol.	Peak Amp	Average Factor	AVG Result	AVG Specification	Margin
(MHz)	V/H	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
315.00	H	78.8	-4.1	74.7	75.6	-0.9
315.00	V	72.2	-4.1	68.1	75.6	-7.5

Figure 7. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Peak

Notes:

- **Detector used:** Peak
- **Average Factor Formula:** $20\log(\text{time on}/\text{time total})$, changing Peak to Average measurements in periodic signals.
- **Average Factor:** $20\log(0.750/1.2) = -4.1$ dB (See *APPENDIX A – Average Factor Calculation*)
- **Carrier Average Specification:** $[(41.67 * 315.00 \text{ MHz})] - 7083 = 6043 \mu\text{V/m}$
- **Limit of Carrier** = $20\log(6043) = 75.6$ dB μ V

Field Strength of Fundamental

E.U.T Description Fully Wireless Indoor Siren
 Type MCS-720
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average

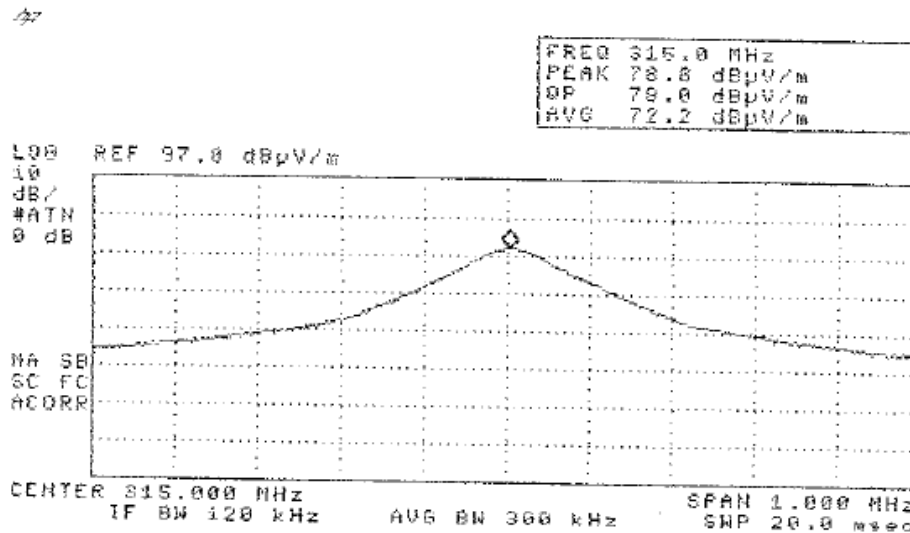


Figure 8. Field Strength of Fundamental.

**Antenna Polarization: HORIZONTAL.
 Detectors: Peak, Quasi-peak, Average**

Field Strength of Fundamental

E.U.T Description Fully Wireless Indoor Siren
 Type MCS-720
 Serial Number: Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Vertical

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average

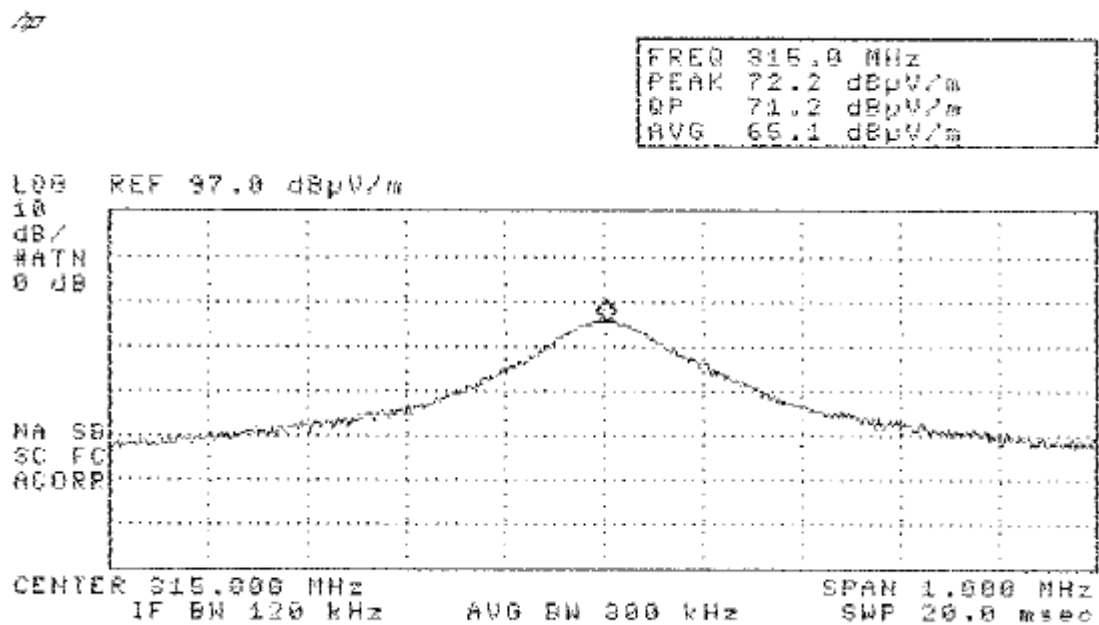


Figure 9. Field Strength of Fundamental.

Antenna Polarization: VERTICAL.
Detectors: Peak, Quasi-peak, Average

6.4 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	HP	8593EM	3536A00120	November 15, 2007	1 year
Amplifier	HP	8447F OPT H64	3113A06386	November 16, 2006	2 year
Biconilog Antenna	EMCO	3142B	1250	30 August 2007	1 Year
Antenna Mast	ARA	AAM-4A	N/A	N/A	N/A
Turntable	ARA	ART-1001/4	N/A	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

7. Radiated Emission, 9 kHz – 30 MHz

7.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

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 9 kHz-30 MHz was scanned.

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.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 10 meters.

The E.U.T. was operated at the frequency of 315.00 MHz. This frequency was measured using a peak detector.

7.3 Measured Data

JUDGEMENT: Passed

The signals in the band 9 kHz – 30 MHz were below the spectrum analyzer noise level.

TEST PERSONNEL:

Tester Signature: *E. Ever*

Date: 16/11/2008

Typed/Printed Name: E. Ever

7.4 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	HP	8593EM	3536A00120	November 15, 2007	1 year
Amplifier	HP	8447F OPT H64	3113A06386	November 16, 2006	2 year
Antenna Loop	EMCO	6507	1448	August 21, 2008	1 year
Antenna Mast	ARA	AAM-4A	N/A	N/A	N/A
Turntable	ARA	ART-1001/4	N/A	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	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:

$$FS = RA + AF + CF$$

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

No external pre-amplifiers are used.

8. Spurious Radiated Emission

8.1 Test Specification

30 – 3,150 MHz, F.C.C., Part 15, Subpart C

8.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3. See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

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 5. Spurious Radiated Emission*.

The signals from the list of the highest emissions were verified and the list was 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.

In the frequency range 2.9 – 3.2 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.)

The emissions were measured at a distance of 3 meters.

8.3 Test Data

JUDGEMENT: Passed by 9.2 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

The margin between the emission level and the specification limit was 9.2 dB in the worst case at the frequency of 945.00 MHz, horizontal polarization.

TEST PERSONNEL:

Tester Signature: *E. Ever*

Date: 16/11/2008

Typed/Printed Name: E. Ever

Radiated Emission

E.U.T Description Fully Wireless Indoor Siren
 Type MCS-720
 Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 3,150 MHz
 Antenna: 3 meters distance Detectors: Peak, Quasi-peak

Frequency (MHz)	POL (V/H)	Peak Amp (dBμV/m)	Average Factor (dB)	Average Amp (dBμV/m)	Average Specification (dBμV/m)	Margin (dB)	Pass/Fail
630.00	H	44.7	--4.1	40.6	55.6	-15.0	PASS
945.00	H	50.5	-4.1	46.4	55.6	-9.2	PASS
945.00	V	48.8	-4.1	44.7	55.6	-10.9	PASS
1260.00	V	46.6	-4.1	42.5	55.6	-13.1	PASS

**Figure 10. Radiated Emission. Antenna Polarization: VERTICAL.
 Detectors: Peak, Quasi-peak**

Note: 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.

- **Detector used:** Peak
- **Average Factor Formula:** $20\log$ (time on/time total), changing Peak to Average measurements in periodic signals.
- **Average Factor:** $20\log(0.750/1.2) = -4.1\text{dB}$ (See APPENDIX A – Average Factor Calculation)
- **Carrier Average Specification:** $[(41.67 \times 315.00 \text{ MHz})] - 7083 = 6043 \mu\text{V/m}$
- **Limit of Carrier** = $20\log(6043) = 75.6 \text{ dB}\mu\text{V}$
- **Spurious Average Specification:** Limit of Carrier – 20dB

Note: Testing was performed to the 10th harmonic.

8.4 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	HP	8593EM	3536A00120	November 15, 2007	1 year
Amplifier	HP	8447F OPT H64	3113A06386	November 16, 2006	2 year
Biconilog Antenna	EMCO	3142B	1250	30 August 2007	1 Year
Antenna Mast	ARA	AAM-4A	N/A	N/A	N/A
Turntable	ARA	ART-1001/4	N/A	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

9. Bandwidth

9.1 Test Specification

F.C.C. Part 15, Subpart C: 15.231(c)

9.2 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 30 kHz resolution BW and center frequency of the transmitter fundamental. The spectrum bandwidth of the transmitter unit was measured and recorded.

The EUT was set up as shown in *Figure 11* and *Figure 12*, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on the modulation envelope.

18:10:23 OCT 28, 2008

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKA 314.900 MHz
59.93 dB μ V

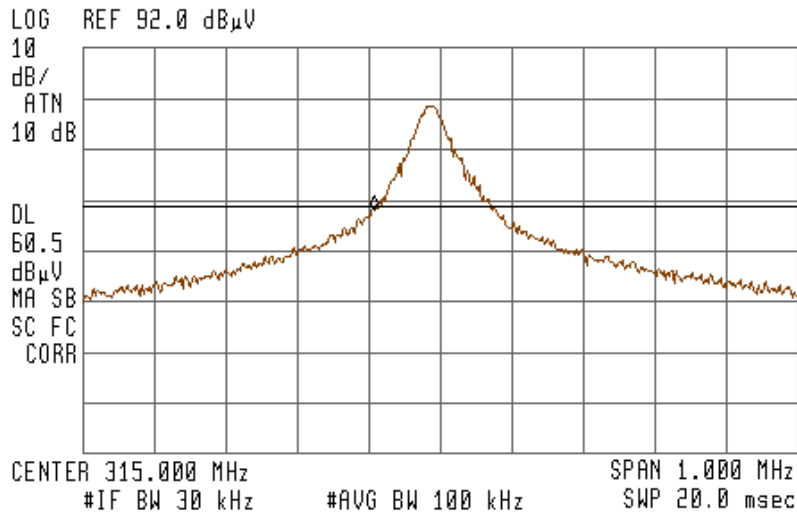


Figure 11 F_{Low}

18:04:11 OCT 28, 2008

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKA 315.078 MHz
59.78 dB μ V

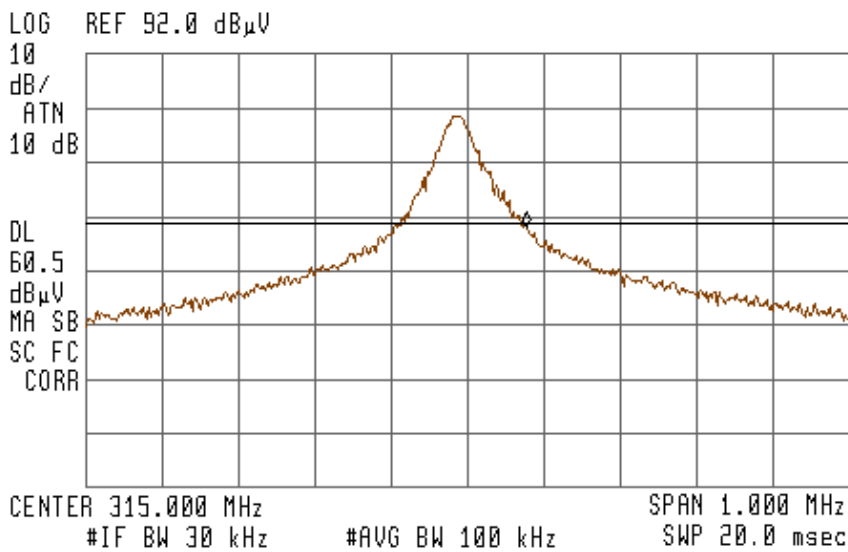


Figure 12 F_{High}

9.3 Results table

E.U.T Description: Fully Wireless Indoor Siren
 Model: MCS-720
 Serial Number: Not Designated
 Specification: F.C.C. Part 15, Subpart C: (15.231(c))

Bandwidth Reading (kHz)	Specification (1) (kHz)	Margin (kHz)
0.170	< 0.787 MHz	0.617

Figure 13 Bandwidth

JUDGEMENT: Passed by 617.00 kHz

TEST PERSONNEL:

Tester Signature: *E. Ever* Date: 16/11/2008

Typed/Printed Name: E. Ever

(1) 0.25% of the E.U.T. fundamental frequency, Section 15.231(c).

9.4 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	8546A	3650A00365	November 30, 2007	1 year
RF Section	HP	85460A	3650A00365	November 30, 2007	1 year

10. APPENDIX A – Average Factor Calculation

Pulse Duration = 750 μ s (See Figure 14)

Pulse Period: (1 plot) = 1.2 ms (See Figure 15)

Average factor: $20\log(0.750/1.2) = -4.1\text{dB}$

09:23:10 OCT 29, 2008

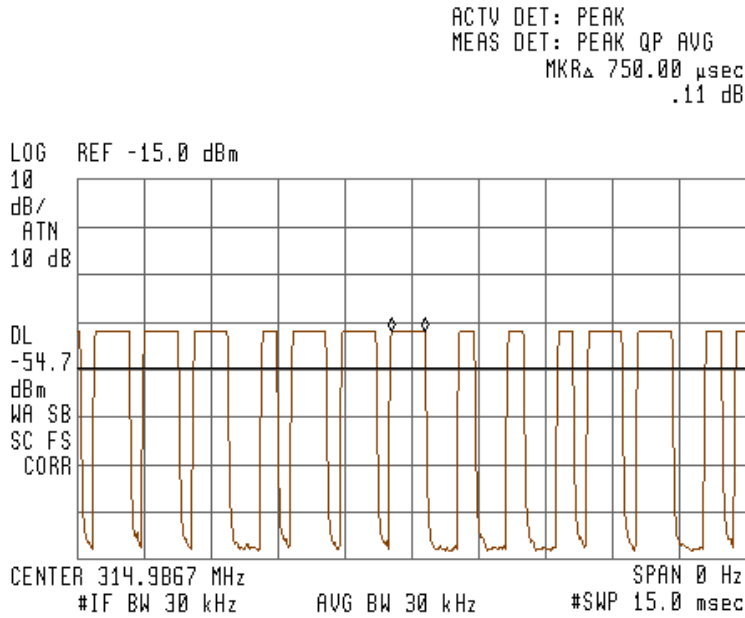


Figure 14 Pulse duration: = 750 μ sec

09:30:04 OCT 29, 2008

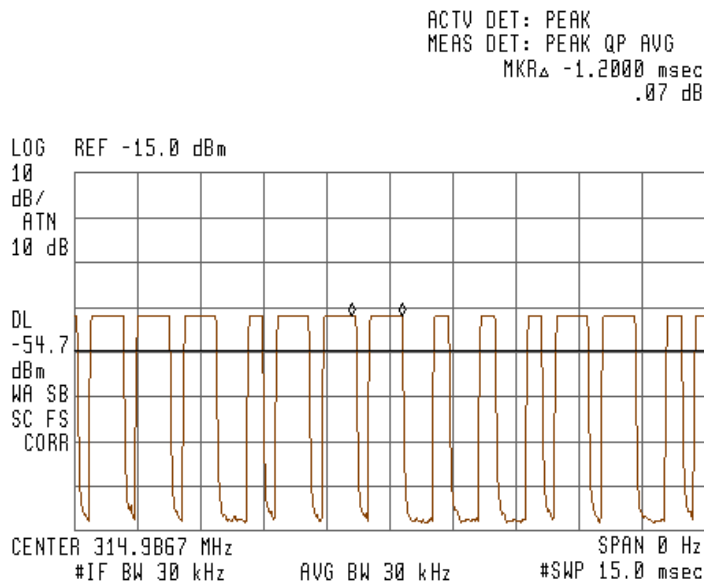


Figure 15 Pulse period: (1 plot) = 1.2msec

11. APPENDIX B - CORRECTION FACTORS

11.1 Correction factors for CABLE from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
30	1.96	700	11.25
35	2.08	800	12.53
40	2.26	900	13.86
45	2.43	1000	14.86
50	2.59	1200	15.7
55	2.65	1400	17.05
60	2.86	1600	18.2
65	2.96	1800	19.4
70	3.04	2000	21.3
75	3.27		
80	3.41		
85	3.54		
90	3.68		
95	3.77		
100	3.93		
110	4.19		
120	4.41		
130	4.6		
140	4.83		
150	5.06		
160	5.35		
170	5.57		
180	5.7		
190	5.84		
200	6.02		
250	6.86		
300	7.59		
350	8.09		
400	8.7		
450	9.15		
500	9.53		
550	9.82		
600	10.24		
650	10.74		

NOTES:

1. The cable type is RG-214/U.

**11.2 Correction factors for
GAIN****Amplifier 8447F 30M-1.3G**

FREQUENCY (MHz)	GAIN (dB)
20	27.16
30	27.18
50	27.15
100	27.01
200	26.48
500	27.54
1000	26.96
1100	26.69
1200	26.28
1300	25.85

11.3 Correction factors for Bilog ANTENNA

**Model: 3142
Antenna serial number: 1250
3 meter range**

FREQUENCY	AFE	FREQUENCY	AFE
(MHz)	(dB/m)	(MHz)	(dB/m)
30	18.4	1100	25
40	13.7	1200	24.9
50	9.9	1300	26
60	8.1	1400	26.1
70	7.4	1500	27.1
80	7.2	1600	27.2
90	7.5	1700	28.3
100	8.5	1800	28.1
120	7.8	1900	28.5
140	8.5	2000	28.9
160	10.8		
180	10.4		
200	10.5		
250	12.7		
300	14.3		
400	17		
500	18.6		
600	19.6		
700	21.1		
800	21.4		
900	23.5		
1000	24.3		