



DATE: 22 March 2012

I.T.L. (PRODUCT TESTING) LTD.
FCC Radio Test Report
for
AeroScout Ltd.

Equipment under test:

Hand Hygiene Integrated Exciter

EX-3300

Written by:

D. Shidowsky, Documentation

Approved by: For/

A. Moses, Test Engineer

Approved by:

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



Measurement/Technical Report for

AeroScout Ltd. Hand Hygiene Integrated Exciter

EX-3300

FCC ID: Q3HEX3300

IC: 5115A-EX3300

This report concerns:	Original Grant: Class I change: Class II change:
Equipment type:	Part 15 Low Power Transmitter Below 1705 kHz
47CFR15 Section 15.205; 15.209	
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") Reuven Amsalem AeroScout Ltd. 3 Pekeris St. Einstein Entrance 4 th Floor Rechovot 76702 Israel Tel: + 972 - 8 - 936 - 9393 Fax: + 972 - 8- 936 - 8977 e-mail: reuven.amsalem@aeroscout.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. SYSTEM TEST CONFIGURATION-----	7
2.1 Justification	7
2.2 Special Accessories	7
2.3 Equipment Modifications	7
2.4 Configuration of Tested System	8
3. TEST SET-UP PHOTOS-----	9
4. AVERAGE FACTOR CALCULATION-----	11
4.1 Test Instrumentation Used	13
5. FIELD STRENGTH OF FUNDAMENTAL-----	14
5.1 Test Specification	14
5.2 Test Procedure	14
5.3 Measured Data	14
5.4 Test Instrumentation Used, Field Strength of Fundamental	16
6. RADIATED EMISSION, 9 KHZ – 30 MHZ-----	17
6.1 Test Specification	17
6.2 Test Procedure	17
6.3 Measured Data	17
6.4 Test Instrumentation Used, Radiated Measurements	19
6.5 Field Strength Calculation	19
7. SPURIOUS RADIATED EMISSION-----	20
7.1 Test Specification	20
7.2 Test Procedure	20
7.3 Test Data	20
7.4 Test Instrumentation Used, Radiated Measurements	21
8. 11. APPENDIX A - CORRECTION FACTORS-----	22
8.1 Correction factors for CABLE	22
8.2 Correction factors for CABLE	23
8.3 Correction factors for LOG PERIODIC ANTENNA	24
8.4 Correction factors for BICONICAL ANTENNA	25
8.5 Correction factors for ACTIVE LOOP ANTENNA	26
9. APPENDIX B – COMPARISON OF INDUSTRY CANADA REQUIREMENTS WITH FCC REQUIREMENTS-----	27



1. General Information

1.1 Administrative Information

Manufacturer: AeroScout Ltd.

Manufacturer's Address: 3 Pekeris St.
Einstein Entrance
4th Floor
Rehovot 76702
Israel
Tel: +972-8-9369393
Fax: +972-8-9365977

Manufacturer's Representative: Leonid Gnusin
Dadi Matza

Equipment Under Test (E.U.T): Hand Hygiene Integrated Exciter

Equipment Model No.: EX-3300

Equipment Serial No.: Not Designated

Date of Receipt of E.U.T: 03.11.11

Start of Test: 03.11.11

End of Test: 07.11.11

Test Laboratory Location: I.T.L (Product Testing) Ltd.
Kfar Bin Nun,
ISRAEL 99780

Test Specifications: FCC Part 15 Subpart 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), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.

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 Hand Hygiene Integrated Exciter (EX-3300) is a component of AeroScout location system. This device acts as a beaconsing device that triggers AeroScout Tags to transmit a message to the AeroScout location system and modify the tag behavior.

The integrated unit is embedded into Hand Hygiene dispenser and will act as a single device for Healthcare solutions.

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 Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 06, 2009).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2): ± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2): ± 4.96 dB



2. System Test Configuration

2.1 Justification

To select the worst case host to be tested for Limited Modular Approval certification, an exploratory radiated emission test was performed. The E.U.T, inside of each host, was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 1 meters. The frequency range of measurement was 9 kHz - 1 GHz.

The transmitter unit operated with CW mode at 125 kHz. The EMI receiver was set to 9 KHz resolution BW.

The results of the exploratory fundamental and spurious radiated emission tests are shown in the table below.

Host	Fundamental Frequency Level (dB μ V/m)	Second Harmonic Peak Reading (dB μ V/m)	Third Harmonic Peak reading (dB μ V/m)
EX3300 ECOLAB	80.5	56.2	49.9
EX3300 GOJO	61.95	45.3	39.9

Based on the above results, the EX3300 Ecolab was selected to be tested.

2.2 Special Accessories

No special accessories were needed.

2.3 Equipment Modifications

No modifications were needed in order to achieve compliance



2.4 Configuration of Tested System



Figure 1. Configuration of Tested System



3. Test Set-up Photos



Figure 2. Exploratory Radiated Emission Test Host ECOLAB

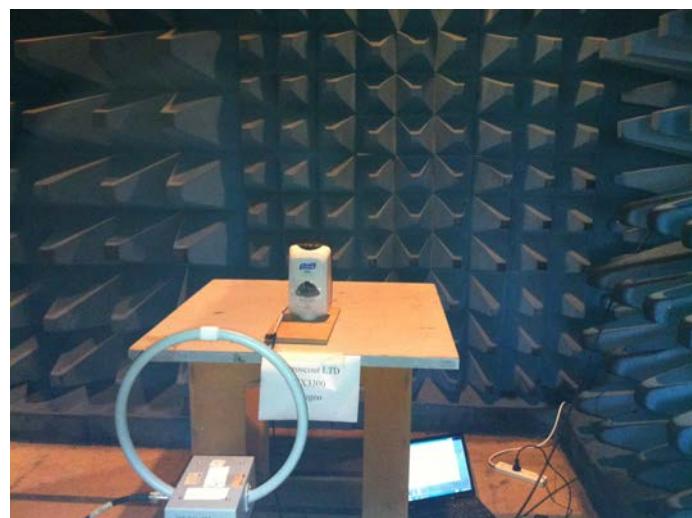


Figure 3. Exploratory Radiated Emission Test Host GOJO



Figure 4. Radiated Emission Test

4. Average Factor Calculation

1. Pulse period = 720usec (worst scenario)*
2. Pulse duration = 360usec (worst scenario)*
3. Burst duration = 65msec
4. Time between bursts = 195msec
5. Average Factor = $20 \log \left[\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of burst within 100msec} \right]$

$$\text{Average Factor} = 20 \log \left[\frac{360}{720} \times \frac{65}{100} \right] = -9.76 \text{dB}$$

*Note: Unit applies OOK modulation with Manchester coding, worst case scenario is 50% ON signal.

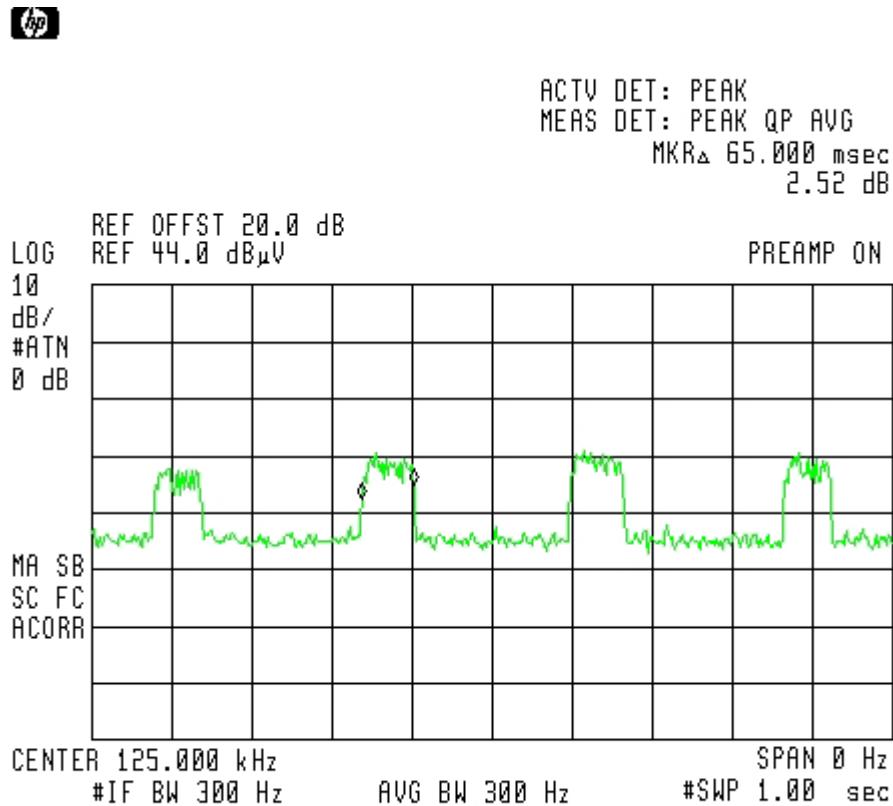


Figure 5. Transmission Burst Duration = 65 msec



Average Factor Calculation

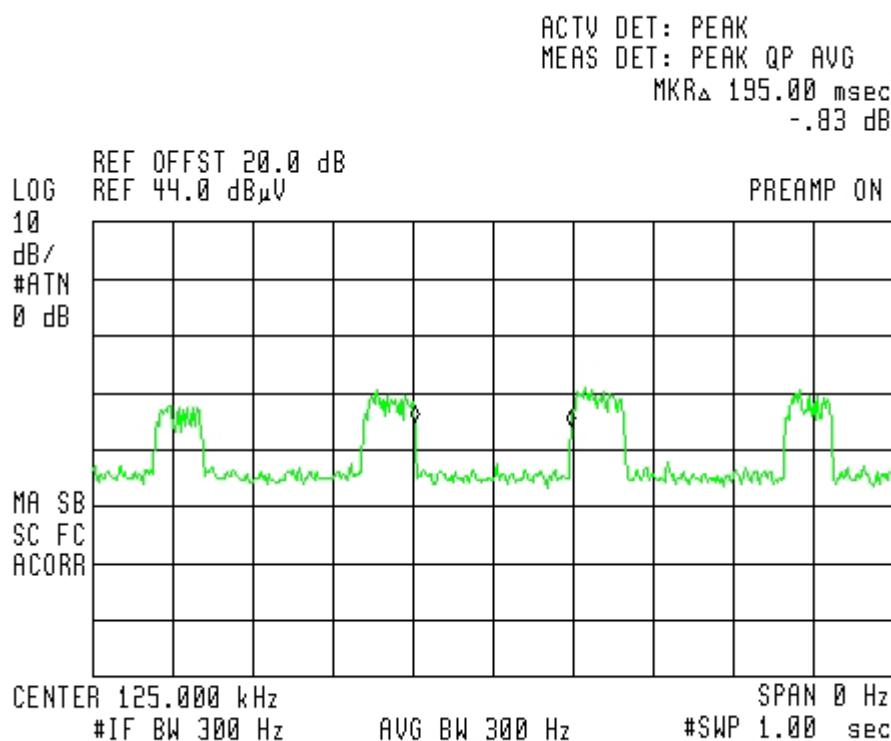


Figure 6. Time Between Transmissions 195 msec



Average Factor Calculation

4.1 *Test Instrumentation Used*

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2011	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	LaserJet 2200	JPKGC19982	N/A	N/A



5. Field Strength of Fundamental

5.1 **Test Specification**

F.C.C., Part 15, Subpart C

5.2 **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 (125 kHz) and Peak Detection.
The distance between the E.U.T. and test antenna was 3 meters.
The turntable and antenna were adjusted for maximum level reading on the EMI receiver. The loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter.

The average result is:

Peak Level(dB μ V/m) + Average Factor (dB)

5.3 **Measured Data**

JUDGEMENT: Passed by 21.74 dB

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

The details of the highest emissions are given in *Figure 8*.

TEST PERSONNEL:

Tester Signature: For/ A. Moses Date: 25.03.12

Typed/Printed Name: A. Moses



Field Strength of Fundamental

E.U.T Description Hand Hygiene
Integrated Exciter
Type EX-3300
Serial Number: Not Designated

Frequency (MHz)	Peak Reading (dB μ V/m)	Specification (dB μ V/m)	Margin (dB)
0.125	83.93	105.67	-21.74

Figure 7. Field Strength of Fundamental.
Detector: Peak

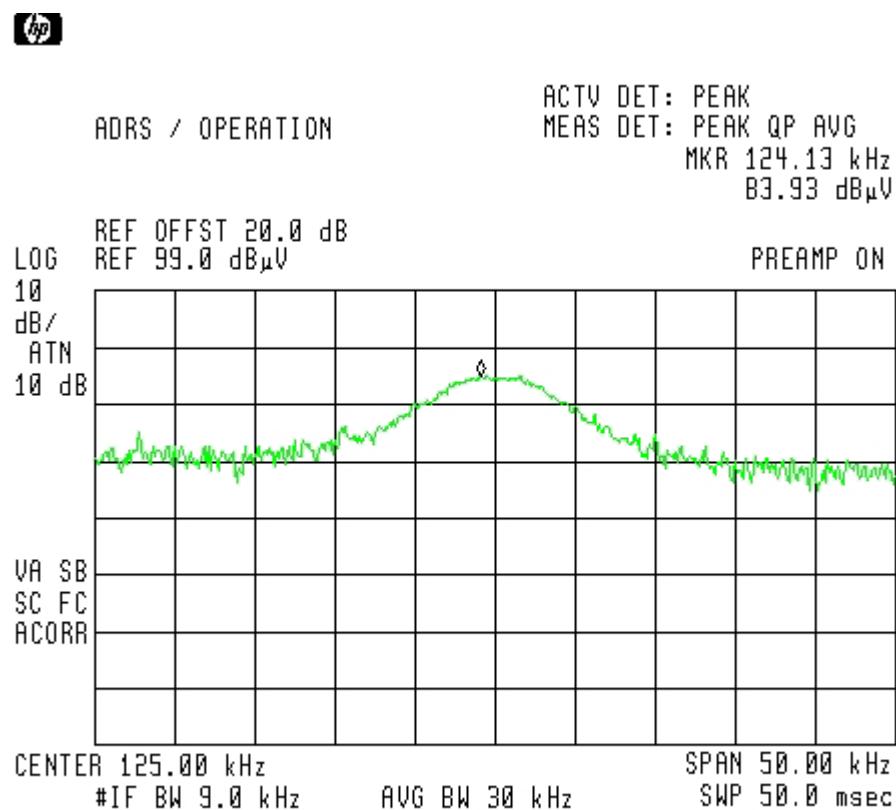


Figure 8. Field Strength of Fundamental.
Detector: Peak

Average Limit = 105.67 dB μ V/m



Field Strength of Fundamental

5.4 ***Test Instrumentation Used, Field Strength of Fundamental***

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2011	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	LaserJet 2200	JPKGC19982	N/A	N/A



6. Radiated Emission, 9 kHz – 30 MHz

6.1 ***Test Specification***

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

6.2 ***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 3 meters.

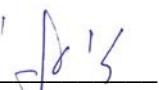
The E.U.T. was operated at the frequency of 125 kHz. This frequency was measured using a peak detector.

6.3 ***Measured Data***

JUDGEMENT: Passed by 47.6 dB

The EUT was tested and it met the requirements of the FCC Part 15, Subpart C, specification.

TEST PERSONNEL:

Tester Signature: For/ 

Date: 25.03.12

Typed/Printed Name: A. Moses



Radiated Emission

E.U.T Description Hand Hygiene
 Integrated Exciter
Type EX-3300
Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna: 3 meters distance

Frequency range: 9 kHz to 30 MHz

Detectors: Peak

Frequency (kHz)	Peak Reading (dB μ V/m)	Average Factor (dB)	Average Result (dB μ V/m)	Average Specification (dB μ V/m)	Margin (dB)
250.0	61.8	-9.76	52.04	99.65	-47.6
375.0	57.5	-9.76	47.74	96.12	-48.38

Figure 9. Radiated Emission. Antenna Polarization: HORIZONTAL.
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.



6.4 **Test Instrumentation Used, Radiated Measurements**

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24,2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2011	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

6.5 **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]

Example: $FS = 30.7 \text{ dB}\mu\text{V (RA)} + 14.0 \text{ dB (AF)} + 0.9 \text{ dB (CF)} = 45.6 \text{ dB}\mu\text{V}$

No external pre-amplifiers are used.



7. Spurious Radiated Emission

7.1 **Test Specification**

30 - 1000 MHz, F.C.C., Part 15, Subpart C

7.2 **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 1.

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.

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.

7.3 **Test Data**

JUDGEMENT: Passed

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

No signals were detected in the frequency range of 30 -1000 MHz.

TEST PERSONNEL:

Tester Signature: For/ A. Moses

Date: 25.03.12

Typed/Printed Name: A. Moses



7.4 *Test Instrumentation Used, Radiated Measurements*

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24,2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Antenna Bioconical	ETS	3109	002-3244	August 31, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 29, 2011	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	LaserJet 2200	JPKGC19982	N/A	N/A



8. 11. APPENDIX A - CORRECTION FACTORS

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

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
90.0	1.6		
100.0	1.7		
150.0	2.0		
200.0	2.3		
250.0	2.7		
300.0	3.1		
350.0	3.4		
400.0	3.7		
450.0	4.0		
500.0	4.3		
600.0	4.7		
700.0	5.3		
800.0	5.9		
900.0	6.3		
1000.0	6.7		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".



8.2 *Correction factors for*

**CABLE
from EMI receiver
to test antenna
at 3 meter range.**

FREQUENCY	CORRECTION FACTOR
(GHz)	(dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.



8.3 Correction factors for LOG PERIODIC ANTENNA

Type LPD 2010/A
at 3 and 10 meter ranges.

Distance of 3 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	12.5
400.0	15.4
500.0	16.1
600.0	19.2
700.0	19.4
800.0	19.9
900.0	21.2
1000.0	23.5

Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.8
400.0	15.3
500.0	15.6
600.0	18.7
700.0	19.1
800.0	20.2
900.0	21.1
1000.0	23.2

NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".



8.4 Correction factors for BICONICAL ANTENNA

Type 3109,
at 3 meter range

FREQUENCY (MHz)	AFE (dB/m)
30.0	13.3
40.0	12.7
50.0	11.0
60.0	9.2
70.0	10.0
80.0	7.2
90.0	7.9
100.0	9.4
120.0	11.9
140.0	13.1
160.0	12.3
180.0	12.4
200.0	14.8
250.0	15.3
300.0	17.9

NOTE:

1. Antenna serial number is 002-3244.



8.5 Correction factors for ACTIVE LOOP ANTENNA
Model 6502
S/N 9506-2950

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2



9. APPENDIX B – Comparison of Industry Canada Requirements With FCC Requirements

FCC Specification	FCC Standard	IC Standard
Spurious Emission	47CFR15.209	RSS-210 Section 2.5