ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust

ACCREDITED
TESTING Cert No.1152.01

DATE: 27 August 2014

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

FCC Radio Test Report

for

Orpak Systems Ltd.

Equipment under test:

Fuel Pump Nozzle Reader

NNR*; NNR + SWITCH;
NNR LARGE; NNR LARGE + SWITCH

*See customer's Declaration on page 6

Written by: _____

R. Pinchuck, Documentation

Approved by: _____

M. Zohar, Test Engineer

Approved by: _____

I. Raz, EMC Laboratory Manager

Measurement/Technical Report for
Orpak Systems Ltd.

Fuel Pump Nozzle Reader

NNR*; NNR + SWITCH;
NNR LARGE; NNR LARGE + SWITCH

*See customer's Declaration on page 6

FCC ID: W8F800960000

IC: 8264A-800960000

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	

Equipment type: Spread Spectrum/Digital Device 2400-2483.5 MHz and Part 15 Low Power Transmitter Below 1705 kHz

Limits used: 47CFR15 Section 15.209, 47 CFR15 Section 15.247

Measurement procedure used is KDB 558074 D01 v03r02 June 5, 2014 and ANSI C63.4: 2003.

Application for Certification
prepared by:
R. Pinchuck
ITL (Product Testing) Ltd.
1 Bat Sheva Street
Lod, 7116002
Israel
e-mail Rpinchuck@itl.co.il

Applicant for this device:
(different from "prepared by")
Gideon Segal
Orpak Systems Ltd.
31 Lechi St.
P.O.B. 1461
Bnei-Brak, 51114
Israel
Tel: +972- 3 - 577 - 6868
Fax: +972- 3 - 579 - 6310
e-mail: gidi@orpak.com

TABLE OF CONTENTS

1. General Information

1.1 Administrative Information

Manufacturer:	Orpak Systems Ltd.
Manufacturer's Address:	31 Lechi St. P.O.B. 1461 Bnei-Brak, 51114 Israel Tel: +972-3-577-6868 Fax: +972-3-579-6310
Manufacturer's Representative:	Yair Elul
Equipment Under Test (E.U.T):	Fuel Pump Nozzle Reader
Equipment Model No.:	NNR*****; NNR + SWITCH; NNR LARGE; NNR LARGE + SWITCH
Equipment Part No.:	Not Designated
Date of Receipt of E.U.T:	17.07.14
Start of Test:	17.07.14
End of Test:	26.08.14
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15 Subpart C RSS-210 Issue 8, 2010

*See customer's Declaration on following page.

ORPAK Systems Ltd., 31 Lechi St., P.O.Box 1461 Bnei Brak 51114 Israel
Tel: 972-3-577-6868 ● Fax: 972-3-579-6310 ● www.orpak.com

Date: 26 October 2014

DECLARATION

I HEREBY DECLARE THAT:

1. **THE NNR IS IDENTICAL TO THE NNR + SWITCH EXCEPT FOR A MECHANICAL SWITCH.**

2. **THE NNR LARGE IS IDENTICAL TO THE NNR LARGE + SWITCH EXCEPT FOR A MECHANICAL SWITCH.**

3. **THE DIFFERENCE BETWEEN THE NNR/NNR + SWITCH AND THE NNR LARGE/NNR LARGE + SWITCH, IS THAT THE NNR LARGE/NNR LARGE + SWITCH HAVE A LARGER HOUSING.**

4. **ALL FOUR UNITS CONTAIN THE IDENTICAL 2.4 GHZ RADIO TRANSMITTER AND HAVE THE SAME RF CIRCUITRY.**

Please relate to them (from an EMC/RADIO point of view) as the same product.

Thank you,
Signature: _____

Printed Name: Gidi Segal
Quality Assurance Director
Orpak Systems Ltd.

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.

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 NNR is an add-on device designed to be installed on the dispenser's nozzle. It is a self -powered device that does not require any connections to any other existing components of the dispenser due to its wireless nature. The NNR has only mechanical interface to the nozzle without any wires or electronic interface to the nozzle, dispenser or any other station equipment.

The NNR reads (Frequency: 108 – 131 kHz) the vehicle information from the RFID FuelOpass and after that transmits (Frequency: 2.405-2.480 GHz) it to the WGT over wireless channel**.**

The EUT comes in four models: NNR, NNR + Switch, NNR Large and NNR Large + Switch. The large models contain a larger housing. The switch feature is purely a mechanical feature.

1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 v03r02 June 5, 2014 and ANSI 63-4: 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 November 21, 2012).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

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):
± 4.98 dB

2. System Test Configuration

2.1 Justification

Radiated emission screening was performed in 3 orthogonal orientations. The worst case orientation was the horizontal position.

The NNR + Switch was fully tested.

The 2 models, NNR LARGE and NNR LARGE + SWITCH contain a larger housing than the NNR and NNR + SWITCH. Accordingly, field strength of fundamental and radiated emission testing were performed on these two units.

2.2 EUT Exercise Software

Commands were sent via hyper terminal to the WGT tester to operate the E.U.T.

2.3 Special Accessories

No accessories were used.

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.

2.5 Configuration of Tested System

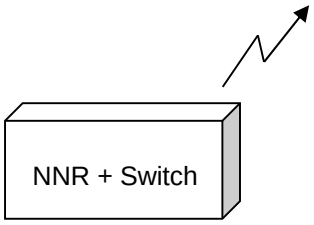

Figure 1. Configuration of Tested System

3. Test Setup Photos

Figure 2. Radiated Emission Test Setup

Figure 3. Radiated Emission Test Setup

Figure 4. Radiated Emission Test Setup

Figure 5. Radiated Emission Test Setup

4. Field Strength of Fundamental (125 kHz Transmitter)

4.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.209

4.2 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 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.

4.3 Test Results for NNR + SWITCH

Frequency (KHz)	Reading (dBµV/m)	LIMIT (dBµV/m)	Margin (dB)
108.1	89.8	106.1	-16.3
125	89.4	105.6	-16.2
131.1	88.0	105.2	-17.2

Figure 6. Field Strength of Fundamental 125 KHz Transmitter Test Results – NNR + SWITCH

The EUT met the FCC Part 15, Subpart C, Section 15.209 specification requirements.

JUDGEMENT: Passed by 16.2 dB

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

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

Field Strength of Fundamental

E.U.T Description	Fuel Pump Nozzle Reader
Model Number	NNR + SWITCH
Part Number:	Not Designated

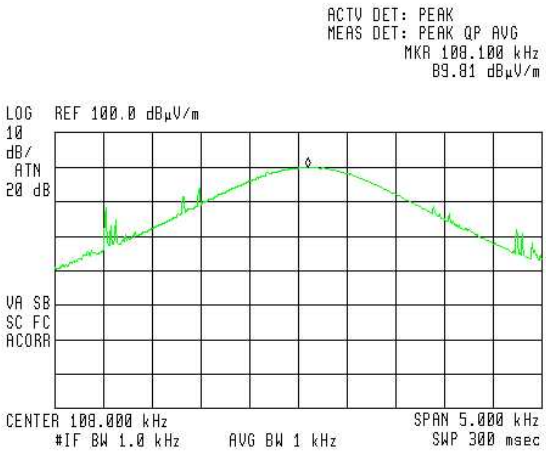

Figure 7. Field Strength of Fundamental, Low Detector: Peak

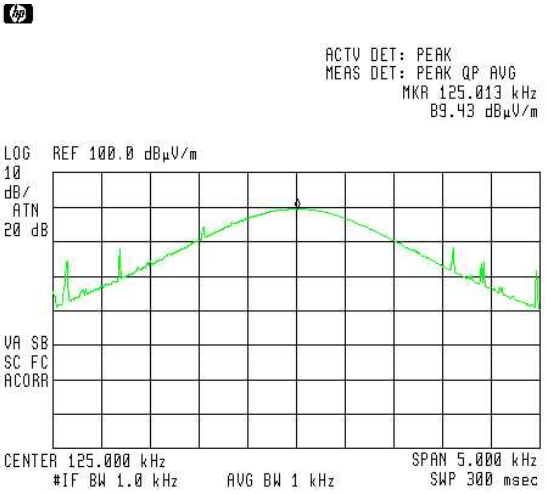

Figure 8. Field Strength of Fundamental, Mid Detector: Peak

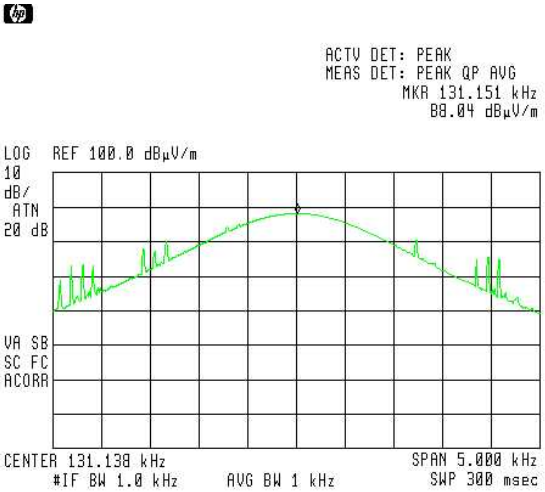

Figure 9. Field Strength of Fundamental, High Detector: Peak

4.4 Test Results for NNR LARGE and NNR LARGE + SWITCH

Frequency (KHz)	Reading (dBµV/m)	LIMIT (dBµV/m)	Margin (dB)
108.1	93.5	106.1	-12.6
125	92.3	105.6	-13.3
131.1	91.8	105.2	-13.4

Figure 10. Field Strength of Fundamental 125 KHz Transmitter Test Results – NNR LARGE

Frequency (KHz)	Reading (dBµV/m)	LIMIT (dBµV/m)	Margin (dB)
108.1	91.7	106.1	-14.4
125	92.3	105.6	-13.3
131.1	93.5	105.2	-11.7

Figure 11. Field Strength of Fundamental 125 KHz Transmitter Test Results – NNR LARGE + SWITCH

The EUT met the FCC Part 15, Subpart C, Section 15.209 specification requirements.

JUDGEMENT: NNR Large passed by 12.6 dB
NNR Large + Switch passed by 11.7 dB

The details of the highest emissions are given in *Figure 15* to *Figure 14.*

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: I.Siboni

Field Strength of Fundamental

E.U.T Description	Fuel Pump Nozzle Reader
Model Number	NNR LARGE
Part Number:	Not Designated

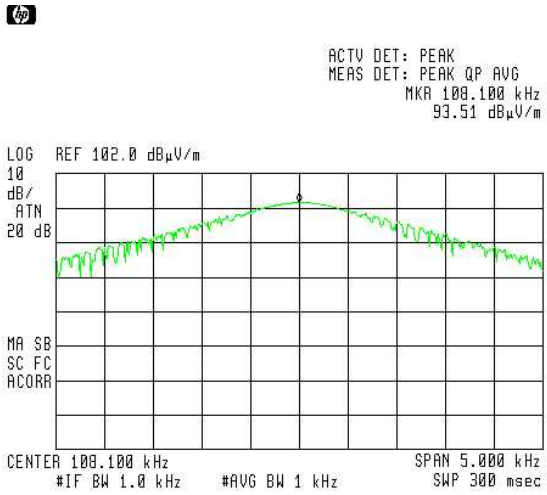

Figure 12. Field Strength of Fundamental, Low
Detector: Peak

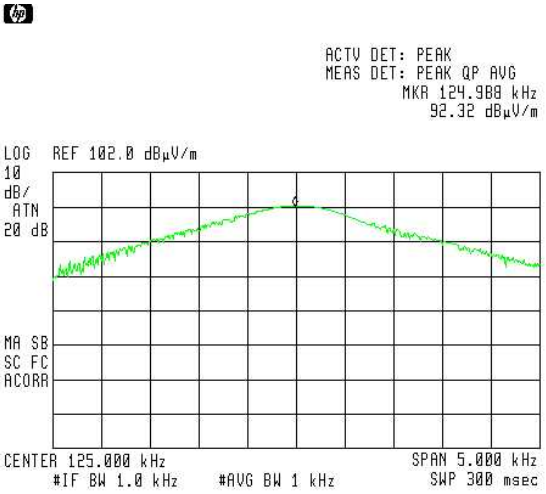

Figure 13. Field Strength of Fundamental, Mid
Detector: Peak

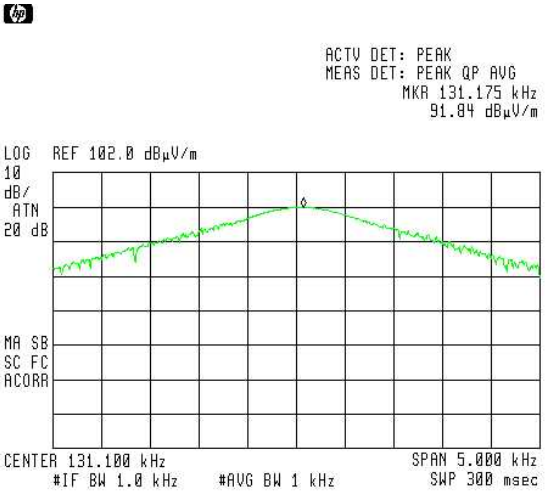

Figure 14. Field Strength of Fundamental, High

Field Strength of Fundamental

E.U.T Description	Fuel Pump Nozzle Reader
Model Number	NNR LARGE + SWITCH
Part Number:	Not Designated

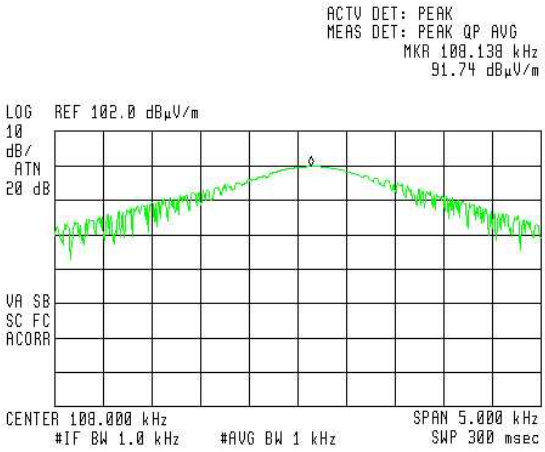

Figure 15. Field Strength of Fundamental, Low Detector: Peak

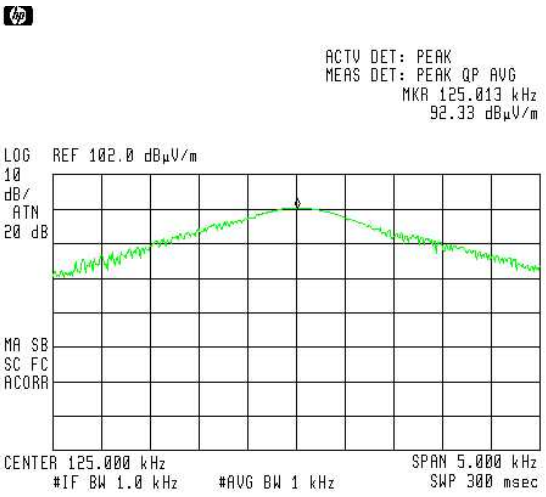

Figure 16. Field Strength of Fundamental, Mid Detector: Peak

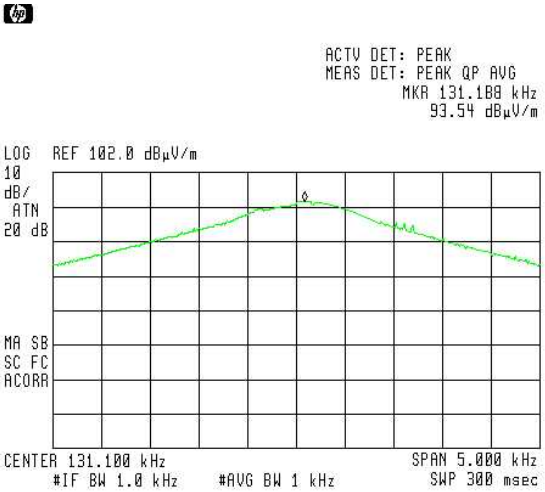

Figure 17. Field Strength of Fundamental, High Detector: Peak

4.4 Test Instrumentation Used; Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Loop Antenna	EMCO	6502	9506-2950	November 4, 2013	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

Figure 18. Test Equipment Used

5. Radiated Emission, 9 kHz – 30 MHz (125 kHz Transmitter)

5.1 Test Specification

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

5.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 2.

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 with 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 108.1 kHz, 125 kHz and 131.1 kHz. This frequency was measured using a peak detector.

5.3 Test Results for NNR + SWITCH

JUDGEMENT: Passed by 20.7 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

See additional information in *Figure 19.*

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

Radiated Emission 9 kHz – 30 MHz, (125 kHz Transmitter)

E.U.T Description Fuel Pump Nozzle Reader
Model Number NNR + SWITCH
Part Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 9 kHz to 30.0 MHz
Test Distance: 3 meters Detector: Peak
Operation Frequency:108.1 kHz,125 kHz,131.1kHz

Operation Frequency	Frequency	Peak Reading	Specification	Margin
(kHz)	(kHz)	(dBµV/m)	(dBµV/m)	(dB)
108.1	540.8	45.1	99.6	-54.5
108.1	756.6	57.6	96.6	-39.0
125.0	375.0	62.8	96.1	-33.3
125.0	625.0	51.1	71.8	-20.7
131.1	393.5	61.4	95.8	-34.4
131.1	1180.0	40.7	66.8	-26.1

Figure 19. Radiated Emission – NNR + SWITCH

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.

5.4 Test Results for NNR LARGE and NNR LARGE + SWITCH

JUDGEMENT: NNR Large passed by 16.1 dB
NNR Large + Switch passed by 16.2 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

See additional information in *Figure 21* to *Figure 20*.

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: I.Siboni

Radiated Emission 9 kHz – 30 MHz, (125 kHz Transmitter)

E.U.T Description	Fuel Pump Nozzle Reader
Model Number	NNR LARGE
Part Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 9 kHz to 30.0 MHz
Test Distance: 3 meters Detector: Peak
Operation Frequency:108.1 kHz,125 kHz,131.1kHz

Operation Frequency	Frequency	Peak Reading	Specification	Margin
(kHz)	(kHz)	(dBµV/m)	(dBµV/m)	(dB)
108.1	540.8	60.7	99.6	-38.9
108.1	756.6	56.6	96.6	-40.0
125.0	375.0	63.4	96.1	-32.7
125.0	625.0	55.7	71.8	-16.1
131.1	393.5	62.9	95.8	-32.9
131.1	1180.0	44.1	66.8	-22.7

Figure 20. Radiated Emission – NNR LARGE

Radiated Emission 9 kHz – 30 MHz, (125 kHz Transmitter)

E.U.T Description	Fuel Pump Nozzle Reader
Model Number	NNR LARGE + SWITCH
Part Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 9 kHz to 30.0 MHz
Test Distance: 3 meters Detector: Peak
Operation Frequency:108.1 kHz,125 kHz,131.1kHz

Operation Frequency	Frequency	Peak Reading	Specification	Margin
(kHz)	(kHz)	(dBµV/m)	(dBµV/m)	(dB)
108.1	540.8	61.2	99.6	-38.4
108.1	756.6	56.0	96.6	-40.6
125.0	375.0	63.2	96.1	-32.9
125.0	625.0	55.6	71.8	-16.2
131.1	393.5	62.9	95.8	-32.9
131.1	1180.0	44.5	66.8	-22.3

Figure 21. Radiated Emission – NNR LARGE + SWITCH

5.5 Test Instrumentation Used; Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Loop Antenna	EMCO	6502	9506-2950	November 4, 2013	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

Figure 22. Test Equipment Used

5.6 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 [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

6. Bandwidth for 125 kHz Transmitter

6.1 Test Specification

RSS-Gen Issue 3, Section 4.6, December 2010

6.2 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 1 kHz resolution BW and center frequency of the transmitter fundamental. The spectrum bandwidth of the transmitter unit was measured and recorded. The BW was measured at 26dBc points.

The EUT was set up as shown in *Figure 1*, 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.
The E.U.T was tested in 3 operating frequencies: 108.1 KHz, 115.0 KHz and 131.1 KHz.

6.3 Test Results

FREQUENCY (kHz)	READING (kHz)
108.1	4.4
115.0	4.4
131.1	4.4

Figure 23. Bandwidth Test Results

JUDGEMENT: Passed

See additional information in *Figure 24* to *Figure 26*.

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

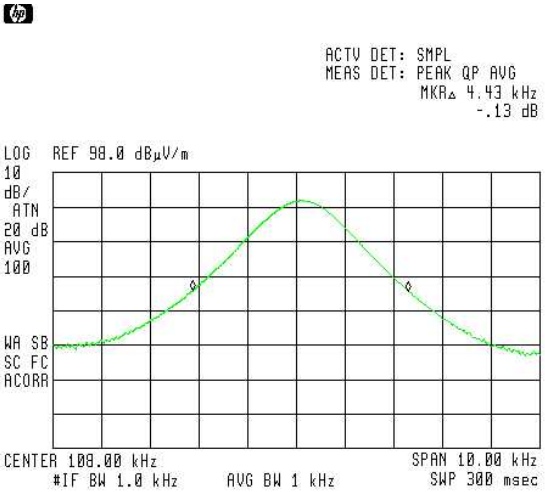

Figure 24 Bandwidth – Low Frequency

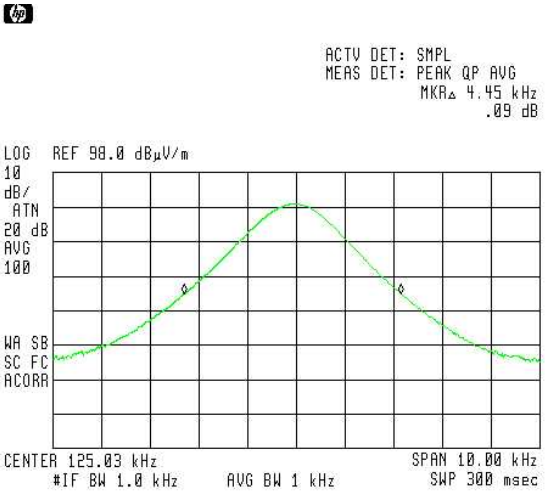

Figure 25 Bandwidth – Mid Frequency

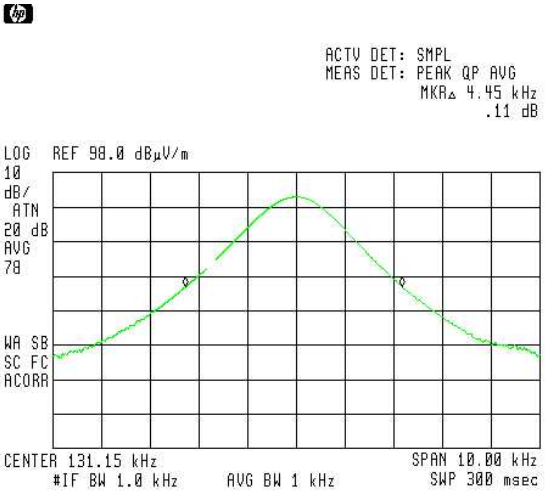

Figure 26 Bandwidth – High Frequency

6.4 Test Equipment Used; Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 27 Test Equipment Used

7. 6dB Minimum Bandwidth

7.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(a)(2)

7.2 Test procedure

The E.U.T 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 3 meters. The transmitter unit operated with normal modulation. The EMI receiver was set to 100 kHz resolution BW. The spectrum bandwidth of the transmitter unit was measured and recorded. The test was performed to measure the transmitter occupied bandwidth. The EUT was set up as shown in Figure 3, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on modulation envelope. The E.U.T. was tested in three operating channels and frequencies (11 (2.405 GHz); 18 (2.440 GHz); 26 (2.480 GHz)).

7.3 Test Results

Operation Frequency (MHz)	Bandwidth Reading (MHz)	Specification (MHz)
2405.00	1.13	>0.5
2440.00	1.31	>0.5
2480.00	1.58	>0.5

Figure 28 — 6dB Minimum Bandwidth Test Results

See additional information in *Figure 29* to *Figure 31*.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

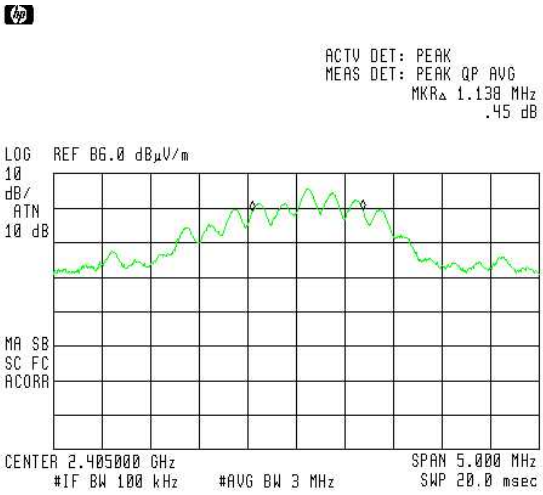

Figure 29. — 2405 MHz

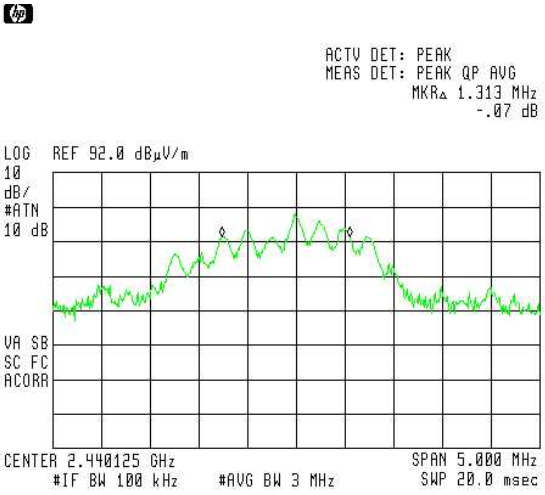

Figure 30. — 2440 MHz

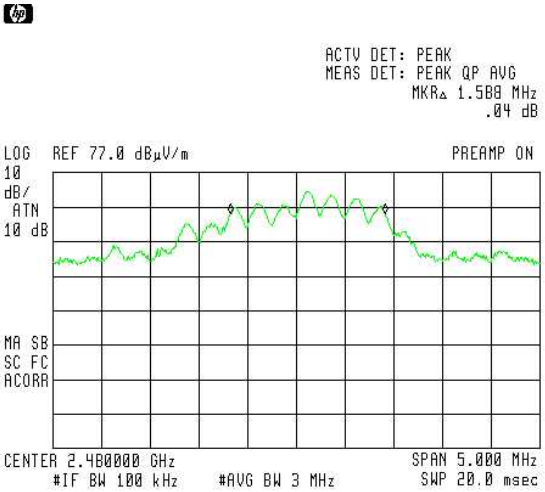

Figure 31. — 2480 MHz

7.4 Test Equipment Used, 6dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 32 Test Equipment Used

8. 26dB Minimum Bandwidth

8.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(a)(2)

8.2 Test procedure

The E.U.T 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 3 meters. The transmitter unit operated with normal modulation. The EMI receiver was set to 100 kHz resolution BW. The spectrum bandwidth of the transmitter unit was measured and recorded. The test was performed to measure the transmitter occupied bandwidth. The EUT was set up as shown in Figure 3, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on modulation envelope. The E.U.T. was tested in three operating channels and frequencies (11 (2.405 GHz); 18 (2.440 GHz); 26 (2.480 GHz)).

8.3 Test Results

Operation Frequency (MHz)	Bandwidth Reading (MHz)
2405.00	2.94
2440.00	2.67
2480.00	3.43

Figure 33 — 26 dB Minimum Bandwidth Test Results

See additional information in *Figure 34* to *Figure 36*.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

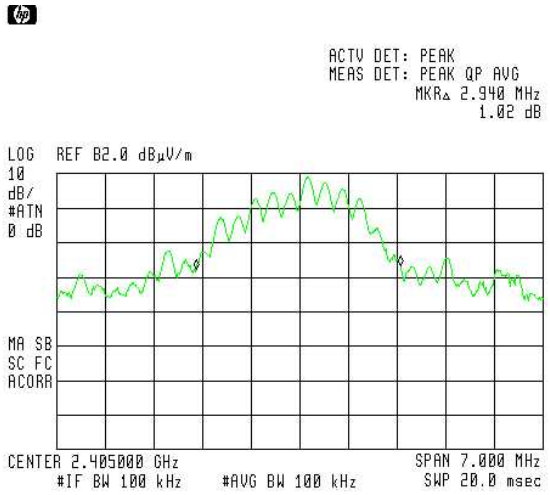

Figure 34. — 2405 MHz

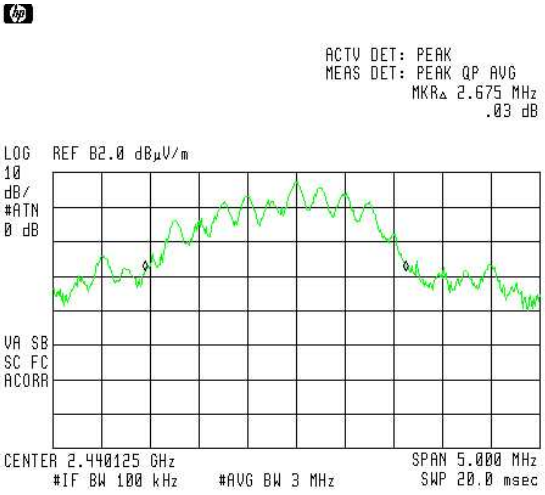

Figure 35. — 2440 MHz

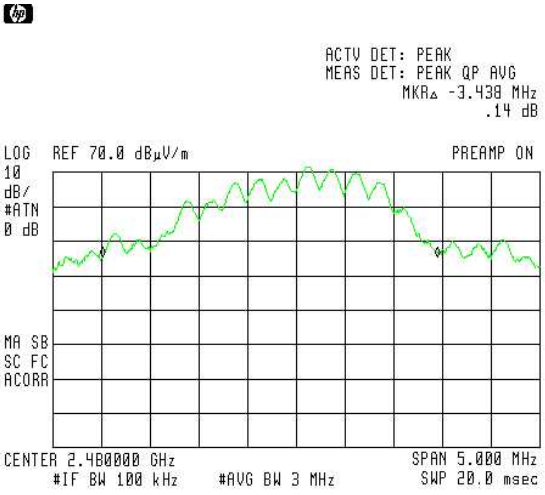

Figure 36. — 2480 MHz

8.4 Test Equipment Used, 26 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 37 Test Equipment Used

9. Radiated Power Output

9.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(b)

9.2 Test procedure

The E.U.T 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 3 meters. The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in Figure 3, and its proper operation was checked.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

The E.U.T. was tested at 2405, 2440, and 2480 MHz.

9.3 Test Results

Frequency (MHz)	Pol	E (dbµV/m)	Calculated Results (dbm)	Limit (dbm)	Margin (db)
2405	H	88.7	-6.5	30	-36.5
2405	V	94.1	-1.1	30	-31.1
2440	H	83.3	-11.9	30	-41.9
2440	V	91.6	-3.6	30	-33.6
2480	H	81.6	-13.6	30	-43.6
2480	V	88.5	-7.1	30	-37.1

Figure 38 Radiated Power Output Test Results Calculation Table

See additional information in *Figure 39* to *Figure 44*.

JUDGEMENT: Passed by 31.1dB

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

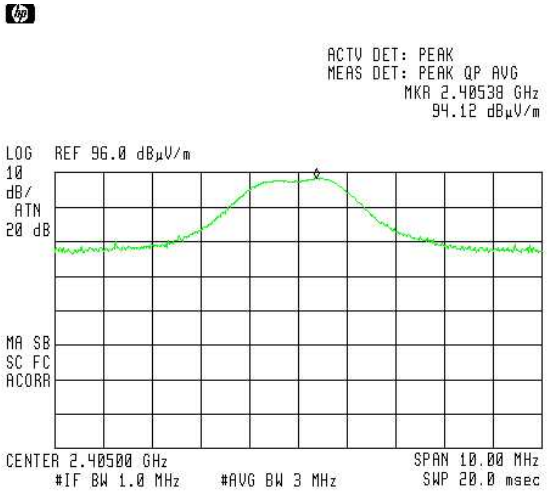

Figure 39 — 2405 MHz Vertical

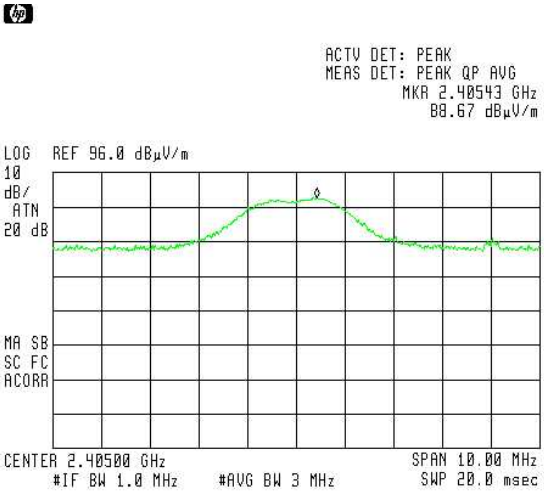

Figure 40 — 2405 MHz Horizontal

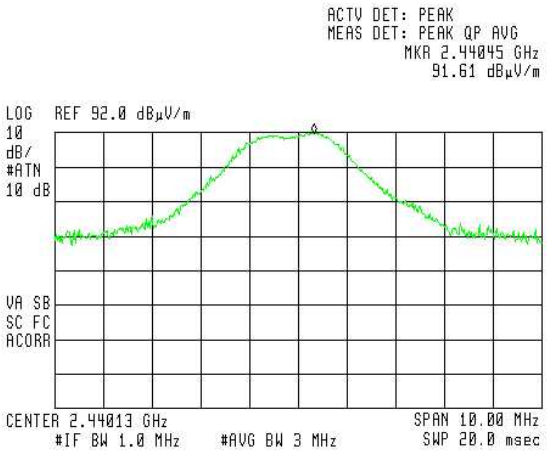

Figure 41 — 2440 MHz Vertical

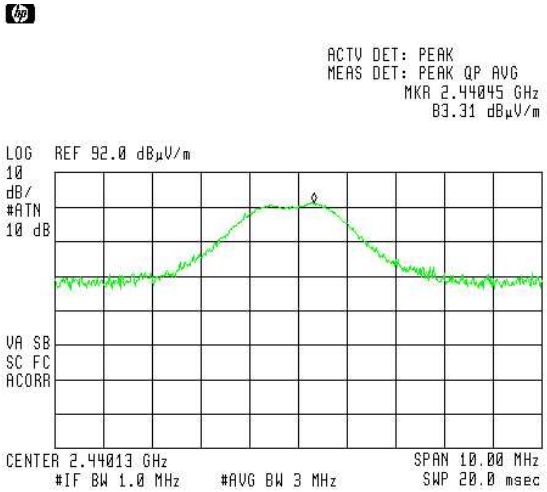

Figure 42 — 2440 MHz Horizontal

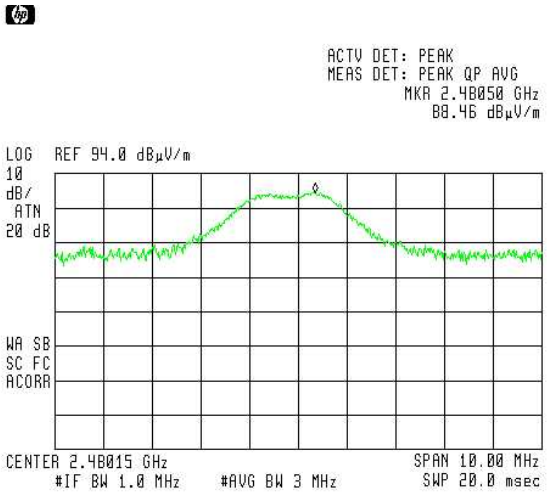

Figure 43 — 2480 MHz Vertical

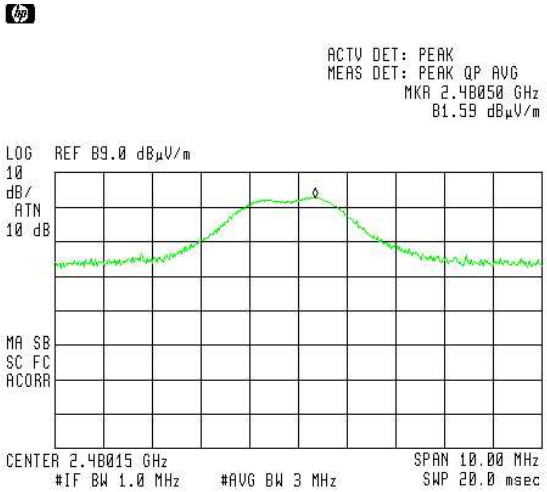

Figure 44 — 2480 MHz Horizontal

9.4 Test Equipment Used; Radiated Maximum Output Power

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 45 Test Equipment Used

10. Band Edge Spectrum

10.1 Test Specification

FCC Part 15 Section 15.247(d)

10.2 Test Procedure

The E.U.T 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 3 meters.
The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in *Figure 1*, and its proper operation was checked.

The EMI receiver was adjusted to the transmission channel at the maximum radiated level. The display line was set to 20 dBc and the EMI receiver was set to the band edge frequencies.

the EMI receiver was set to 100 KHz resolution BW
Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2405 MHz, and 2480 MHz correspondingly.

The E.U.T. was tested in 2 operating channels and frequencies
2.405 GHz, 2.480 GHz.

10.3 Test Results

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)
2405	2400.00	56.4	74.1
2480	2483.50	57.0	68.5

Figure 46 Band Edge Spectrum Test Results Table

See additional information in *Figure 47* to *Figure 48*.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

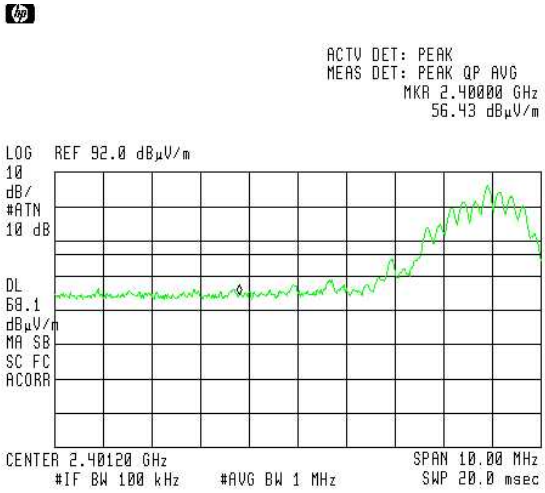

Figure 47 — 2405 MHz

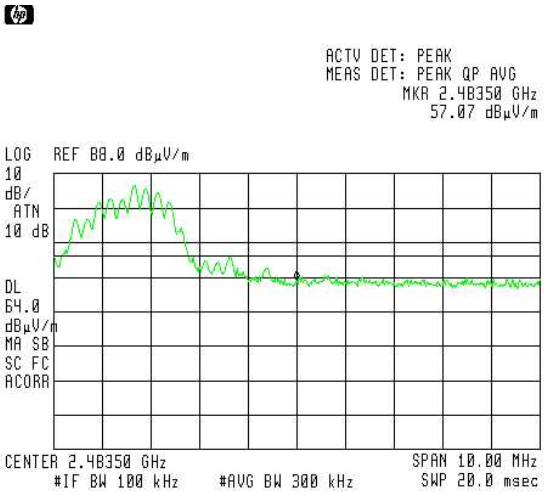

Figure 48 — 2480 MHz

10.4 Test Equipment Used; Band Edge Spectrum

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 49 Test Equipment Used

11. Spurious Radiated Emission, 9 kHz – 30 MHz

11.1 Test Specification

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

11.2 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 E.U.T. highest frequency source or used frequency is 2.4 GHz.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying with 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 tested in three operating frequencies
2.405 GHz; 2.440 GHz; 2.480 GHz.
These frequencies were measured using a peak detector.

11.3 Test Results

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

The results for all three frequencies were the same.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

11.4 Test Equipment Used; Spurious Radiated Emission, 9 kHz–30 MHz

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Loop Antenna	EMCO	6502	9506-2950	November 4, 2013	1 Year
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 50 Test Equipment Used

11.5 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 [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

12. Spurious Radiated Emission, 30 – 25000 MHz

12.1 Test Specification

30 MHz-25000 MHz, F.C.C., Part 15, Subpart C

12.2 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 E.U.T. highest frequency source or used frequency is 2.4 GHz.

The frequency range 30 MHz-25000 MHz was scanned and the list of the highest emissions was verified and 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 with 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 1-2.9 GHz, a computerized EMI receiver complying with CISPR 16 requirements was used.
In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.
The test distance was 3 meters.
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 E.U.T. was tested in three operating frequencies
2.405 GHz; 2.440 GHz; 2.480 GHz.

12.3 Test Results

JUDGEMENT: Passed by 2.6 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

Radiated Emission

E.U.T Description	Fuel Pump Nozzle Reader
Model Number	NNR
Part Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak

Operation Frequency (MHz)	Frequency (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak Specification (dB µV/m)	Margin (dB)
2405.00	2390.00	H	63.7	74	-10.3
2405.00	2390.00	V	62.3	74	-11.7
2405.00	4810.00	H	57.6	74	-16.4
2405.00	4810.00	V	58.7	74	-15.3
2440.00	4880.00	H	55.8	74	-18.2
2440.00	4880.00	V	55.9	74	-18.1
2480.00	2483.50	H	57.4	74	-16.6
2480.00	2483.50	V	61.4	74	-12.6
2480.00	4960.00	H	55.9	74	-18.1
2480.00	4960.00	V	56.4	74	-17.6

Figure 51. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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.

"Peak Reading" includes correction factor.

"Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Fuel Pump Nozzle Reader
Model Number	NNR
Part Number:	Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average

Operation Frequency (MHz)	Frequency (MHz)	Polarity (H/V)	Average Result (dBµV/m)	Average Specification (dB µV/m)	Margin (dB)
2405.00	2390.00	H	51.1	54	-2.9
2405.00	2390.00	V	51.1	54	-2.9
2405.00	4810.00	H	45.7	54	-8.3
2405.00	4810.00	V	46.0	54	-8.0
2440.00	4880.00	H	45.7	54	-8.3
2440.00	4880.00	V	45.4	54	-8.6
2480.00	2483.50	H	51.4	54	-2.6
2480.00	2483.50	V	51.3	54	-2.7
2480.00	4960.00	H	45.8	54	-8.2
2480.00	4960.00	V	46.1	54	-7.9

Figure 52. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

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.

"Peak Reading" includes correction factor.

"Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

12.4 Test Equipment Used, Spurious Radiated Emission, 30 MHz – 25 GHz

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 53 Test Equipment Used

12.5 Field Strength Calculation 30 MHz – 1000 MHz

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[dB\mu v/m]\ \ FS = RA + AF + CF$$

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

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

13. Radiated Power Spectral Density

13.1 Test Specification

FCC Part 15 Section 15.247(e)

13.2 Test Procedure

The E.U.T 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 3 meters.
The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in Figure 3, and its proper operation was checked.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The E.U.T. was tested in three operating frequencies
2.405 GHz; 2.440 GHz; 2.480 GHz.

Then the EMI receiver was set to 3 kHz resolution BW, span of 10MHz, and sweep time of 100 seconds. The spectrum peaks were located at each of the 3 operating frequencies.

Radiated peak output power levels were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

13.3 Test Results

Frequency	E	Calculated Results	Spec.	Margin
(MHz)	(dbµV/m)	(dBm)	(dBm)	(dB)
2405.00	88.9	-6.3	8	-14.3
2440.00	87.5	-7.7	8	-15.7
2480.00	82.2	-13.0	8	-21.0

Figure 54 Radiated Power Spectral Density Test Results Table

See additional information in *Figure 55* to *Figure 57*.

JUDGEMENT: Passed by 14.3dB

TEST PERSONNEL:

Tester Signature: _____ Date: 27.08.14

Typed/Printed Name: M. Zohar

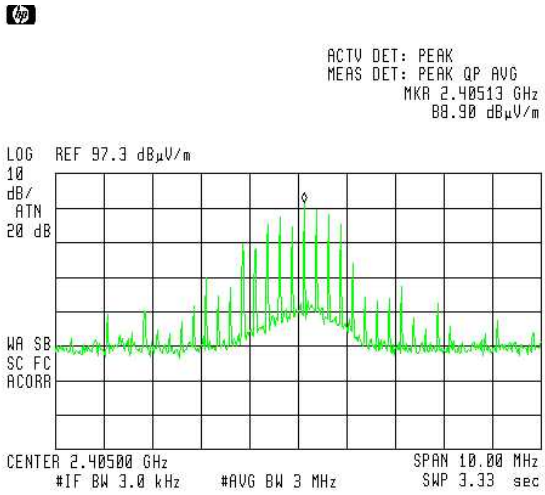

Figure 55 — 2405 MHz

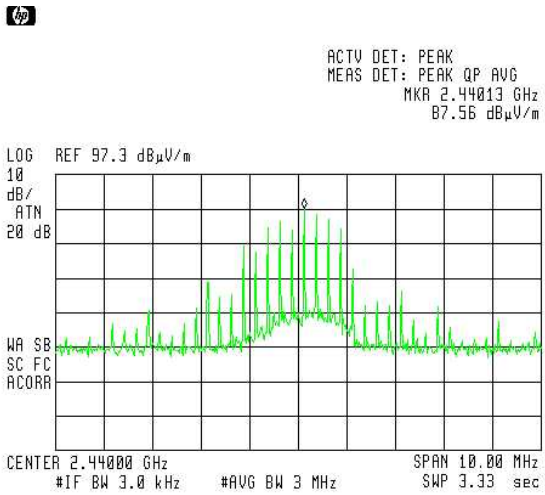

Figure 56 — 2440 MHz

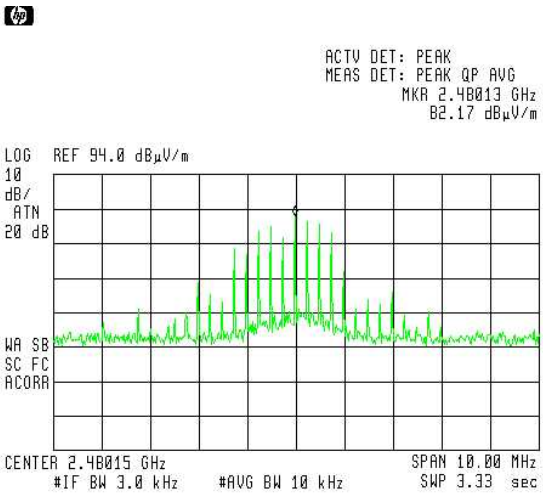

Figure 57 — 2480 MHz

13.4 Test Equipment Used; Radiated Power Spectral Density

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1 Year
Antenna Biconical	EMCO	3104	2606	August 30, 2012	2 Years
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	ETS	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 2, 2014	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	December 1, 2013	2 years
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

Figure 58 Test Equipment Used

14. Antenna Gain/Information

The antenna gain is 1.9 dBi SMD

15. R.F Exposure/Safety

The typical placement of the E.U.T. is on a fuel pump nozzle. The typical distance between the E.U.T. and the user in the worst case application, is 5 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1310(b)(1) Requirements

(a) FCC limits at 2440 MHz is: $1\frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power = 94.1 (dbuV/m) = 0.8 mW (Calculated $P_t + G_t$)

G_T- Antenna Gain 1.9 dBi = 1.55 numeric

R- Distance from Transmitter using 5 cm worst case

(c) The peak power density is :

$$S_p = \frac{0.8}{4\pi (5)^2} = 0.0025\frac{mW}{cm^2}$$

(d) This is below the FCC limit

16. APPENDIX B - CORRECTION FACTORS

16.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.6
30.0	0.8
40.0	0.9
50.0	1.1
60.0	1.2
70.0	1.3
80.0	1.4
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

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	7.3
1400.0	7.8
1600.0	8.4
1800.0	9.1
2000.0	9.9
2300.0	11.2
2600.0	12.2
2900.0	13.0

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".

16.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (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.

16.3 Correction factors for CABLE

**from spectrum analyzer
to test antenna above 2.9 GHz**

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

12.6 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 38M3O.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".*

16.4 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

NOTES:

1. *Antenna serial number is 253.*
2. *The above lists are located in file number SAS3M0.ANT for a 3 meter range.*
3. *The files mentioned above are located on the disk marked "Antenna Factors".*

16.5 Correction factors for BICONICAL ANTENNA

Type BCD-235/B,
at 3 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	19.4
30.0	14.8
40.0	11.9
50.0	10.2
60.0	9.1
70.0	8.5
80.0	8.9
90.0	9.6
100.0	10.3
110.0	11.0
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13.0
180.0	13.5
190.0	14.0
200.0	14.8
210.0	15.3
220.0	15.8
230.0	16.2
240.0	16.6
250.0	17.6
260.0	18.2
270.0	18.4
280.0	18.7
290.0	19.2
300.0	19.9
310	20.7
320	21.9
330	23.4
340	25.1
350	27.0

NOTES:

1. Antenna serial number is 1041.

2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

16.6 Correction factors for Double-Ridged Waveguide Horn

Model: 3115, S/N 29845
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

16.7 Correction factors for ***Horn Antenna***

Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

16.8 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(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

17. Comparison Industry Canada Requirements With FCC

FCC ID: W8F800960000 IC: 8264A-80096000

Test	FCC	IC
❑ Radiated Emission	15.209	RSS 210 Issue 8 Clause 2.5
❑ Max power / Peak power	15.247(b)(3)	RSS 210 Issue 8 A8.4(4)
❑ 6dB BW	15.247(a)2	RSS 210 Issue 8 A8.2a
❑ Power density	15.247(e)	RSS 210 Issue 8 A8.2b
❑ Spurious radiated emission in the restricted band	15.205(c)	RSS 210 Issue 8 2.5 RSS Gen 7.2.2 (Table 1)
❑ Band edge spectrum	15.247(d)	RSS 210 Issue 8 A8.5
❑ RF Exposure Limits	1.1307(b)(1)	RSS 102 4.4