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TESTING Cert No.1152.01

DATE: 18 May 2014

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

FCC Radio Test Report

for

Petratec International Ltd.

Equipment under test:

GAS N GO RFID Nozzle Reader*

Reader 8
(2.4 GHz transceiver)

Written by: _____
R. Pinchuck, Documentation

Approved by: _____
A. Sharabi, Test Engineer

Approved by: _____
For: I. Raz, EMC Laboratory Manager

*See customer's Declaration on page 6.

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Measurement/Technical Report for
Petratec International Ltd.

GAS N GO RFID Nozzle Reader

Reader 8

FCC ID: U54RDR008

18 May 2014

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	
Equipment type:	Digital Transmission System	
Limits used:	47CFR15 Section 15.247	

Measurement procedure used is KDB 558074 D01 v03r02 and ANSI C63.4-2003.

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

Applicant for this device:
(different from "prepared by")
Lior Yehoshua
Gas N Go Ltd.
30 Ha'sivim Street
Petach Tikva
Israel
Tel: +972-3-926-3200
Fax: +972-3-926-3202
e-mail: LIORY@GASNGO

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1. General Information

1.1 Administrative Information

Manufacturer:	Petratec International Ltd.
Manufacturer's Address:	30 Ha'sivim Street Petach Tikva 4959388 Israel Tel: +972-3-926-3200 Fax: +972-3-926-3202
Manufacturer's Representative:	Lior Yehoshua
Equipment Under Test (E.U.T):	GAS N GO RFID Nozzle Reader*
Equipment Model No.:	Reader 8
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	01.05.14
Start of Test:	01.05.14
End of Test:	08.05.14
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15, Sub-Part C

*Note – See customer's Declaration on following page.

GASNGO

Date: 6/25/14

DECLARATION

I hereby declare that the name, model, and serial number of the E.U.T. tested at the I.T.L. EMC laboratory between March 24, 2014 and May 12, 2014 is as follows:

E.U.T. Name: Gas N Go RFID Nozzle Reader
Model Name: Reader 8
Serial Number: Not designated

Please use the above names and serial number in the test report and certificate.

Thank you,

Signature: _____
Printed Name: Lior yehoshua
Title:CTO GasNgo

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 EUT is a RFID nozzle reader. It has a 13.56MHz module to read a passive tag while it also has a 2.4GHz module to communicate with GSC.
The 2.4GHz part is a transceiver and the 13.56MHz part is a RFID reader. In this report, only 2.4GHz part was tested and recorded.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in KDB 558074 D01 v03r02 and 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 November 12, 2012).
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):

± 3.6 dB

Note: See ITL Procedure No. PM 198.

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):

± 5.2 dB

Note: See ITL Procedure No. PM 198.

2. System Test Configuration

2.1 Justification

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

2.2 EUT Exercise Software

No exercise software was used.

2.3 Special Accessories

No special accessories were used.

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance

2.5 Configuration of Tested System

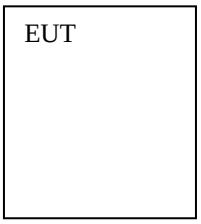

Figure 1. Configuration of Tested System

3. Radiated Measurement Test Set-up Photos

Figure 2. Radiated Emission Test

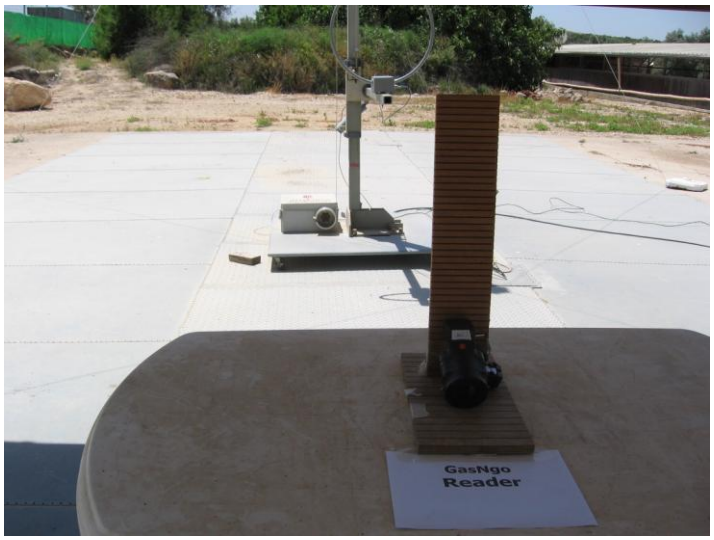

Figure 3. Radiated Emission Test

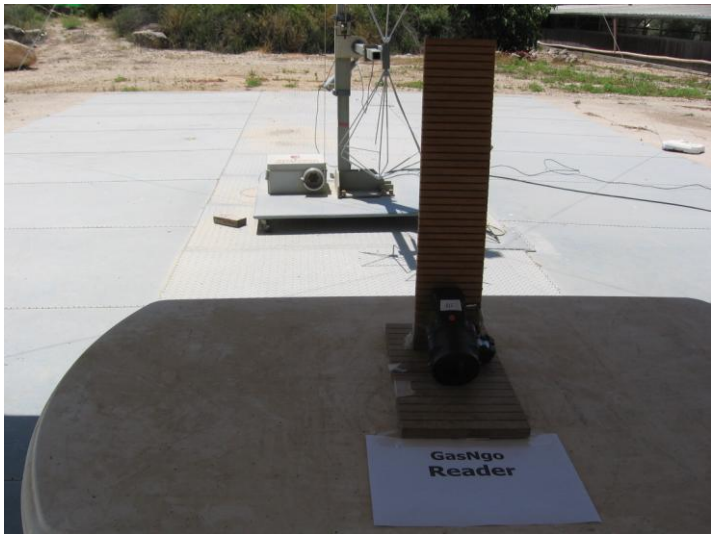

Figure 4. Radiated Emission Test

Figure 5. Radiated Emission Test

4. 6dB Minimum Bandwidth

4.1 Test Specification

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

4.2 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 at 2445 MHz.

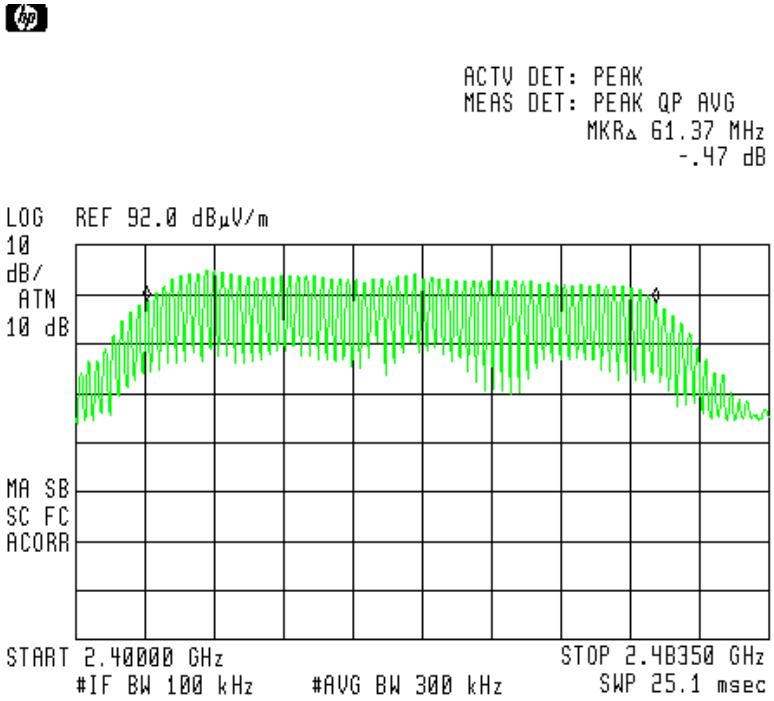

Figure 6. 2400 MHz

4.3 Test Results

E.U.T Description: GAS N GO RFID Nozzle Reader
Model: Reader 8
Serial Number: Not Designated

Operation Frequency (MHz)	Bandwidth Reading (MHz)	Specification (MHz)
2445	61.37	>0.5

Figure 7 Test Results

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 03.07.14

Typed/Printed Name: A. Sharabi

4.4 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 year
RF Section	HP	85420E	3705A00248	January 15, 2014	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 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 8 Test Equipment Used

5. Radiated Power Output

5.1 Test Specification

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

5.2 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 10 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 the following operating frequency: 2.445 GHz.

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level

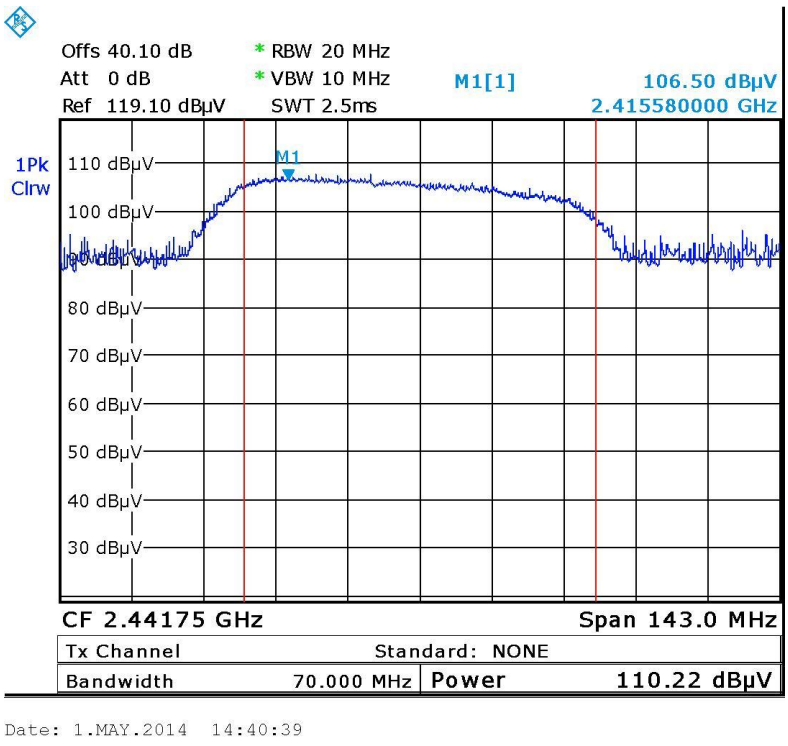

Figure 9 2445 MHz - Horizontal

5.3 Results Calculation

E.U.T. Description: GAS N GO RFID Nozzle Reader
Model No.: Reader 8
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Polarization	Power Level (dBm)	Specification (dBm)	Margin (dB)
2445.0	H	15.0	30.0	-15.0

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 03.07.14

Typed/Printed Name: A. Sharabi

5.4 Test Equipment Used; Radiated Maximum Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	R&S	FSL6	100194	December 1, 2013	1 year
Antenna-Log Periodic	ARA	LPD-2010/A	1038	April 2, 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 10 Test Equipment Used

6. Band Edge

[In Accordance with section 15.247(d)]

6.1 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 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.
Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2445MHz.

The E.U.T. was tested in the operating channel and frequency of 2.445 GHz.

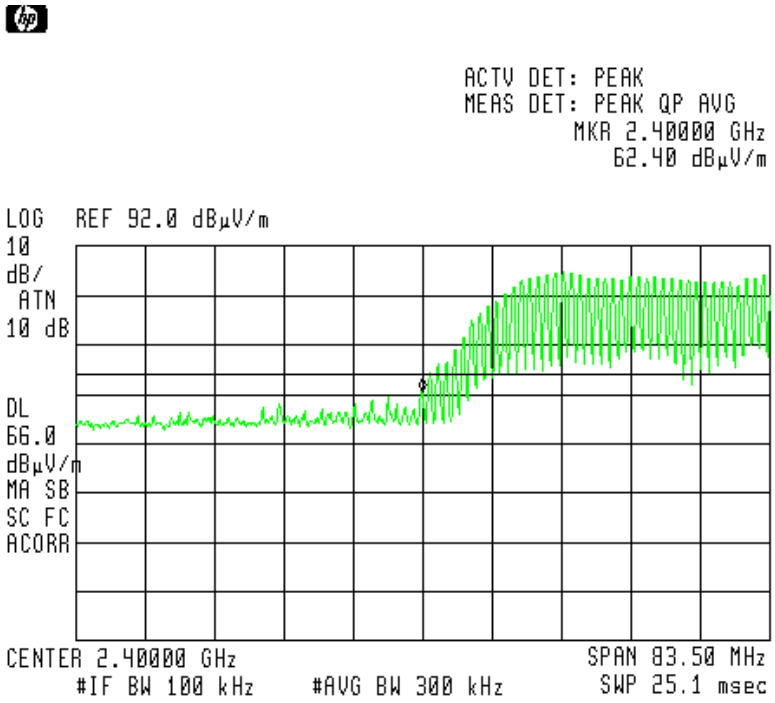

Figure 11 — 2400.0 MHz

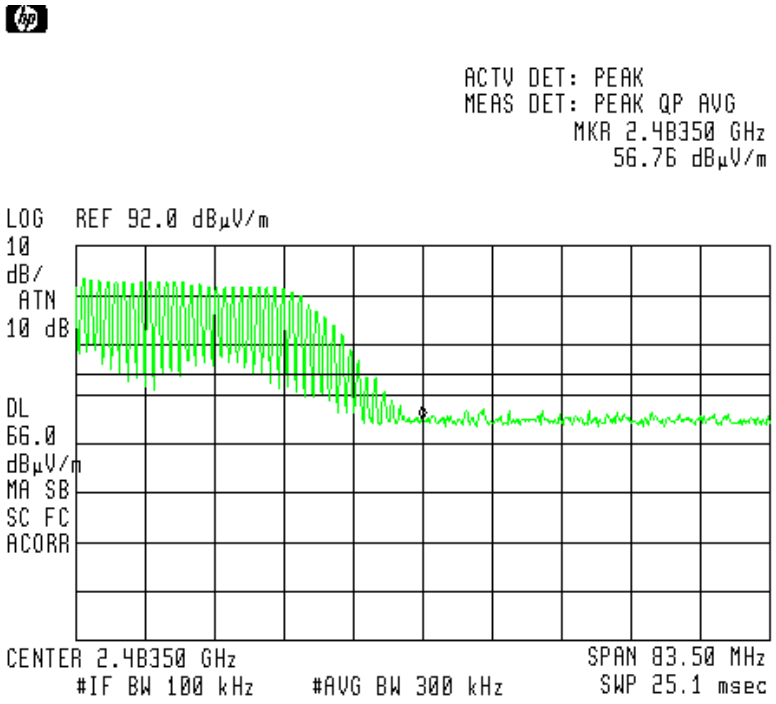

Figure 12 — 2483.5 MHz

6.2 Results table

E.U.T. Description: GAS N GO RFID Nozzle Reader
Model No.: Reader 8
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C (15.247 (d))

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)	Margin (dB)
2445.0	2400.0	62.40	92.0	-29.60
2445.5	2483.5	56.76	92.0	-35.24

Figure 13 Band Edge

JUDGEMENT: Passed by 29.6 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 03.07.14

Typed/Printed Name: A. Sharabi

6.3 Test Equipment Used;Band edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3906A00276	January 15, 2014	1 year
RF Section	HP	85420E	3705A00248	January 15, 2014	1 year
Antenna-Log Periodic	ARA	LPD-2010/A	1038	April 2, 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 14 Test Equipment Used

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 3 meters.

The E.U.T. was operated at the frequency of 2445 MHz. This frequency was measured using a peak detector.

7.3 Measured Data

JUDGEMENT: Passed

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

The results for all three channels were the same.

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

TEST PERSONNEL:

Tester Signature: _____ Date: 03.07.14

Typed/Printed Name: A. Sharabi

7.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 year
RF Section	HP	85420E	3705A00248	January 15, 2014	1 year
Active 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

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 [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.

8. Spurious Radiated Emission 30 – 1000 MHz

8.1 Test Specification

30 MHz-1000 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 frequency range 30 MHz-1000 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 30-1000 MHz, 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 the following operating channel and frequency of 2445 MHz.

8.3 Test Data

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C specification.
The results for all three operation channels were the same.

The signals in the band 30 MHz – 1.0 GHz were below the spectrum analyzer noise level, at least 20 dB below the specification limit.

TEST PERSONNEL:

Tester Signature: _____ Date: 03.07.14

Typed/Printed Name: A. Sharabi

8.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 year
RF Section	HP	85420E	3705A00248	January 15, 2014	1 year
Antenna Biconical	EMCO	3104	2606	August 30, 2013	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 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

8.5 Field Strength Calculation

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

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

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.

9. Spurious Radiated Emission Above 1 GHz

9.1 Radiated Emission Above 1 GHz

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, 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 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.
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 the following operating channel and frequency:
2445 MHz

9.2 Test Data

JUDGEMENT: Passed by 0.8 dB

For the operation channel 1 (2.445 GHz), the margin between the emission level and the specification limit is 0.8 in the worst case at the frequency of 2483.5 MHz, horizontal polarization.

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

The details of the highest emissions are given in *Figure 15* to *Figure 16*.

TEST PERSONNEL:

Tester Signature: _____ Date: 03.07.14

Typed/Printed Name: A. Sharabi

Radiated Emission Above 1 GHz

E.U.T Description	GAS N GO RFID Nozzle Reader
Type	Reader 8
Serial 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: 2445 MHz

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Peak Amp (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2445.0	2390.0	V	64.9	74.0	-9.1
2445.0	2390.0	H	65.3	74.0	-8.7
2445.0	2483.5	V	65.1	74.0	-8.9
2445.0	2483.5	H	65.9	74.0	-8.1
2445.0	4880.0	V	52.7	74.0	-21.3
2445.0	4880.0	H	48.0	74.0	-26.0
2445.0	7320.0	V	51.3	74.0	-22.7
2445.0	7320.0	H	50.3	74.0	-23.7

Figure 15. 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 Amp" includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description GAS N GO RFID Nozzle Reader
Type Reader 8
Serial 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: 2445 MHz

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Average Amp (dBµV/m)	Average Specification (dB µV/m)	Average Margin (dB)
2445.0	2390.0	V	51.8	54.0	-2.2
2445.0	2390.0	H	52.5	54.0	-1.5
2445.0	2483.5	V	52.1	54.0	-1.9
2445.0	2483.5	H	53.2	54.0	-0.8
2445.0	4880.0	V	43.0	54.0	-11.0
2445.0	4880.0	H	41.0	54.0	-13.0
2445.0	7320.0	V	43.5	54.0	-10.5
2445.0	7320.0	H	42.3	54.0	-11.7

Figure 16. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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.

"Average Amp" includes correction factor.

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

9.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1Year
RF Filter Section	HP	85420E	3705A00248	January 15, 2014	1Year
Antenna Biconical	EMCO	3104	2606	August 30, 2013	1Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	2 Years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2012	3 Years
Horn Antenna	ARA	SWH-28	1008	March 30, 2014	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 21, 2013	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
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

10. Radiated Power Spectral Density

[In accordance with section 15.247(d)]

10.1 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 the operating channel and frequency of 2.445 GHz.

Then the EMI receiver was set to 3 kHz resolution BW, span of 100MHZ, The spectrum peaks were located at each of the 3 operating frequencies.

Radiated peak output power levels were converted to power level

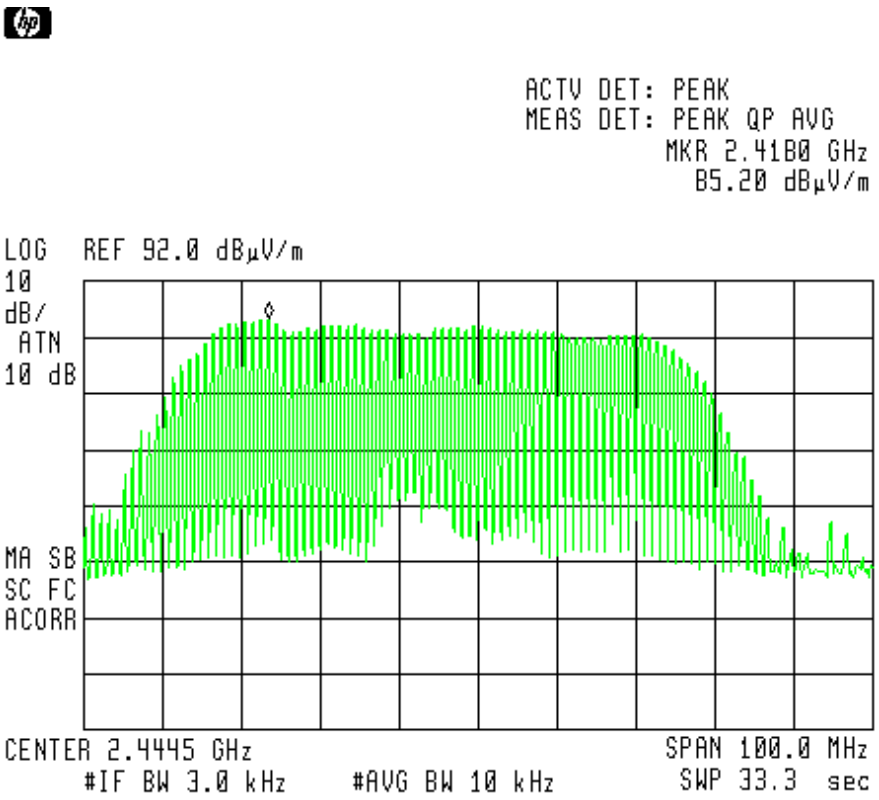

Figure 17 — 2.445 MHz

10.2 Results table

E.U.T. Description: GAS N GO RFID Nozzle Reader
Model No.: Reader 8
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C (15.247(d))

Operation Frequency (MHz)	Spectral Density Result* (dBm)	Specification (dBm)	Margin (dB)
2445	-10.0	8.0	-18.0

Figure 18 Test Results

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 03.07.14

Typed/Printed Name: A. Sharabi

10.3 Test Equipment Used; Transmitted Power Density

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	January 15, 2014	1 year
RF Section	HP	85420E	3705A00248	January 15, 2014	1 year
Antenna Log Periodic	ARA	LPD-2010A	1038	April 2, 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 19 Test Equipment Used

11. Antenna Gain/Information

The antenna gain is 5 dBi.

12. R.F Exposure/Safety

Typical use of the E.U.T. is as a nozzle reader. The typical placement of the E.U.T. is on a 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 Requirements

(a) FCC limits at 2445 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

P_t- Transmitted Power 15 dBm = 31.6 mw (Peak)

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

G_T- Antenna Gain, 5 dBi

*Note – PG was measured radiated so the antenna gain is included in the power result.

R- Distance from Transmitter using 5 cm worst case

(c) The peak power density is :

$$S_p = \frac{31.6}{4\pi(5)^2} = 0.1\frac{mW}{cm^2}$$

(d) This is below the FCC limit.

13. APPENDIX B - CORRECTION FACTORS

13.1 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".*

13.2 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.

13.3 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.

13.4 Correction factors for CABLE

**from EMI receiver
to test antenna
at 10 meter range.**

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.8
30.0	0.9
40.0	1.2
50.0	1.4
60.0	1.6
70.0	1.8
80.0	1.9
90.0	2.0
100.0	2.1
150.0	2.6
200.0	3.2
250.0	3.8
300.0	4.2
350.0	4.6
400.0	5.1
450.0	5.3
500.0	5.6
600.0	6.3
700.0	7.0
800.0	7.6
900.0	8.0
1000.0	8.7

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	9.8
1400.0	10.0
1600.0	11.3
1800.0	12.2
2000.0	13.1
2300.0	14.5
2600.0	15.9
2900.0	16.4

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 34 meters.

3. The above data is located in file 34M10MO.CBL on the disk marked "Radiated Emissions Tests EMI Receiver".

13.5 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".*

13.6 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			

13.7 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

13.8 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