



DATE: 23 July 2013

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

for

Nayax Ltd.

Equipment under test:

VPOS Smart Reader

NAYAXVPOSR5

Written by: # Studburk

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Approved by:

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Approved by:

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.





Measurement/Technical Report for Nayax Ltd.

VPOS Smart Reader

NAYAXVPOSR5

FCC ID: R88NYXA3V

IC: 10840A-NYXA3V

This report concerns: Original Grant: X

Class I change: Class II change:

Equipment type: Part 15 Low Power Communication Device Transmitter

47CFR15 Section 15.225

Measurement procedure used is ANSI C63.4-2003.

Application for Certification Applicant for this device:

prepared by: (different from "prepared by")

Ishaishou Raz Hezi Cohen ITL (Product Testing) Ltd. Nayax Ltd.

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1. General Information

1.1. Administrative Information

Manufacturer: Nayax Ltd.

Manufacturer's Address: 4 HaNechoshet St.,

Tel Aviv, 69710,

Israel

Tel: +972-3-7694332 Fax: +972-3-7694344

Manufacturer's Representative: Hezi Cohen

Equipment Under Test (E.U.T): VPOS Smart Reader

Equipment Model No.: NAYAXVPOSR5

Equipment Part No.: Not Designated

Date of Receipt of E.U.T: 11.10.2012

Start of Test: 11.10.2012

End of Test: 17. 10.2012

Test Laboratory Location: I.T.L (Product Testing) Ltd.

1 Batsheva St., Lod, 7120101

ISRAEL

Test Specifications: FCC Part 15 Subpart C

Section 15.225



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. 861911.
- 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-3006, R-2729, T-1877, G-245.
- 5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025A-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

Nayax VPOS



A universally certified solution designed to provide the financial services and latest technology in order to maximize the benefits of cashless payments, along with a steady & accurate stream of telemetry date designed to provide vending machine operators with the ability to centrally manage their operations from one application. The VPOS smart reader is PCI-DSS, EMV level 1 and 2, swipe, contact and contactless approved and certified by Visa qVSDC, MasterCard M-chip and PA-

DSS. The VPOS reads swipe, contactless, proximity & smart cards.



1.4. Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5. Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Lod, Israel. This site is a FCC listed test laboratory (FCC Registration No. 861911, date of listing June 30, 2010).

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):

 $\pm 4.98 \, dB$.



2. System Test Configuration

2.1. Justification

Testing was performed with the E.U.T. in vertical position as it is mounted on vending machines. The E.U.T. is powered from 12 VDC.

2.2. EUT Exercise Software

Normal operation software was used.

2.3. Special Accessories

No special accessories were needed in order to achieve compliance.

2.4. Equipment Modifications

No modifications were needed in order to achieve compliance.

2.5. Configuration of Tested System

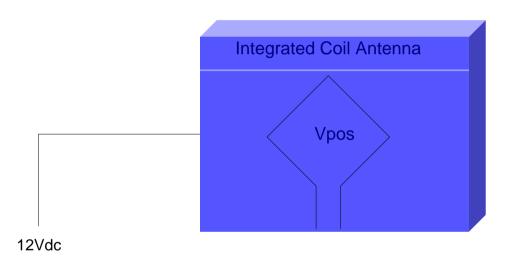


Figure 1. Configuration of Tested System



3. Test Set-up Photos



Figure 2. Radiated Emission Test



4.26dB Minimum Bandwidth

4.1. Test Specification

F.C.C. Part 15, Subpart C, part 2.1049

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 1 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 13.56 MHz.

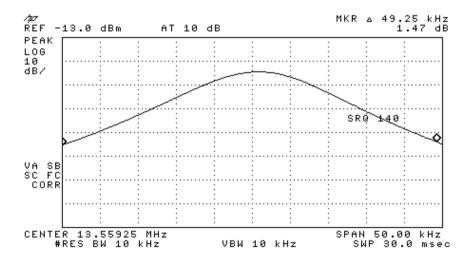


Figure 3. 13.56 MHz



4.3. Test Results

E.U.T Description: VPOS Smart Reader

Model: NAYAXVPOSR5

Serial Number: Not Designated

Operation	Bandwidth
Frequency	Reading
(MHz)	(MHz)
13.56	0.04927

Figure 4 Test Results

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: Date: 23.07 13

Typed/Printed Name: A. Sharabi



4.4. Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	НР	8592L	3826A01204	February 28, 2013	1 year

Figure 5 Test Equipment Used



5. Field Strength of Fundamental

5.1. Test Specification

F.C.C., Part 15, Subpart C, Section 15.225(a) (b)

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 (13.56 MHz) 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.

5.3. Test Results

JUDGEMENT:	Passed	
The EUT met the FC	C Part 15, Subpart C	C, Sections 15.225(a); (b); (c)
Section 15.209; speci	fications requirement	nts.
The details of the high	hest emissions are g	iven in <i>Figure 6</i> to <i>Figure 7</i> .
TEST PERSONNEL:	10	
Tester Signature:	(hrs	Date: 23.07.13
Typed/Printed Name:	A. Sharabi	



Field Strength of Fundamental

E.U.T Description VPOS Smart ReaderModel Number NAYAXVPOSR5Part Number: Not Designated

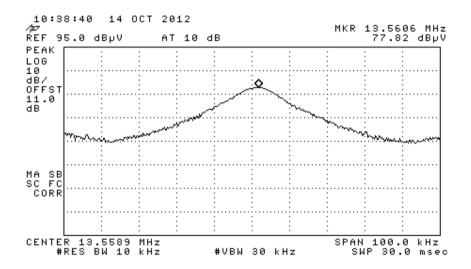
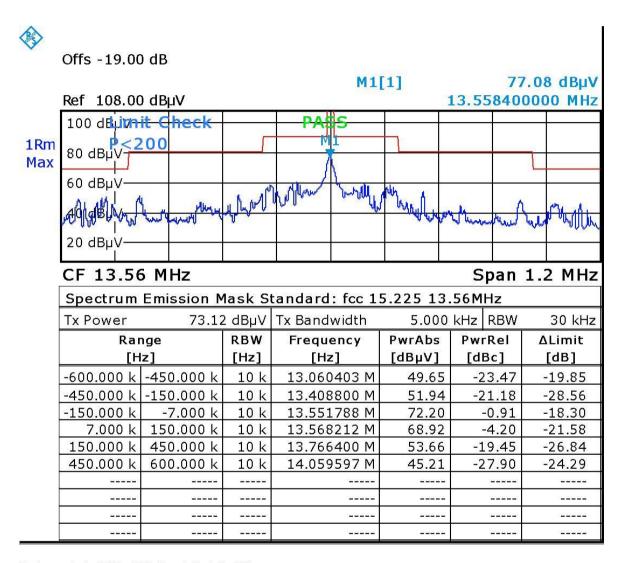


Figure 6. Field Strength of Fundamental Peak=77.82 dBuV/m , Limit =124 dBuV/m



Field Strength of Fundamental

E.U.T Description VPOS Smart Reader
Model Number NAYAXVPOSR5
Part Number: Not Designated



Date: 14.0CT.2012 12:16:05

Figure 7. Mask of Fundamental



5.4. Test Instrumentation Used, Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	НР	8592L	3826A01204	February 28, 2012	1 year
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	October 30, 2011	1 year
Biconilog Antenna	EMCO	3142B	1250	July 07, 2012	1 Year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Turntable Controller	ETS/EMCO	2090	9608-1456	N/A	N/A



6. Spurious 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 with CISPR 16 requirements. The specification limits and applicable correction factors are pre-loaded to the receiver.

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 13.56 MHz. This frequency was measured using a peak detector.

6.3. Test Results

JUDGEMENT: Passed

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

The signals were more than 20 dB below the specification limit.

TEST PERSONNEL:

Tester Signature: _____ Date: 23.07.13

Typed/Printed Name: A. Sharabi



6.4. Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMC Analyzer	НР	HP8593EM	3536A00120ADI	February 28, 2012	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2011	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Turntable Controller	ETS/EMCO	2090	9608-1456	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 [dBμv/m]

RA: Receiver Amplitude [dBµv]

AF: Receiving Antenna Correction Factor [dB/m]

CF: Cable Attenuation Factor [dB]

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

No external pre-amplifiers are used.



7. Spurious Radiated Emission 30 – 1000 MHz

7.1. Test Specification

30 MHz-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 configuration tested is shown in *Figure* 2.

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 pre-loaded to the receiver.

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.

7.3. Test Results

JUDGEMENT: Passed

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

TEST PERSONNEL:

Tester Signature: _____ Date: 23.07.13

Typed/Printed Name: A. Sharabi



Spurious Radiated Emission 30 – 1000 MHz

E.U.T Description VPOS Smart ReaderModel Number NAYAXVPOSR5Part Number: Not Designated

Freq.	Polarity	Peak Reading	Q.Peak Reading	Q.Peak Specification	Peak. Margin
(MHz)	(H/V)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB~\mu V/m)$	(dB)
40.68	V	25.62	21.0	40.0	-19.0
54.24	V	35.10	31.1	40.0	-8.9
67.79	V	24.32	21.3	40.0	-18.7
81.35	V	30.10	27.7	40.0	-12.3
135.59	V	41.87	40.7	43.5	-2.8



7.4. Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMC Analyzer	НР	HP8593EM	3536A00120ADI	February 28, 2012	1 year
Biconilog Antenna	EMCO	3142B	1250	July 07, 2012	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Turntable Controller	ETS/EMCO	2090	9608-1456	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:

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

FS: Field Strength [dBμv/m]

RA: Receiver Amplitude [dBµv]

AF: Receiving Antenna Correction Factor [dB/m]

CF: Cable Attenuation Factor [dB]

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

No external pre-amplifiers are used.



8. Frequency Tolerance

8.1. Test Specification

Part 15 Subpart C Section 15.225(e)

8.2. Test Procedure

The E.U.T operation mode and test setup are as described in Section 3.

The E.U.T. was placed in a test fixture enabling coupling from the E.U.T. to the spectrum analyzer.

The E.U.T. and test fixture were placed inside a temperature chamber. The E.U.T. was operated from 115 VAC at normal temperature (25°C).

The chamber temperature was set to +25°C.

The spectrum analyzer was set to 1.0 kHz span and 1.0 kHz resolution B.W.

The carrier frequency was measured and recorded.

The carrier frequency measurement was repeated for:

- (a). $+25^{\circ}$ C
- (b). -20°C
- (c). $+50^{\circ}$ C

The carrier frequency was measured and recorded after at least 10 minutes of exposing the E.U.T. to the temperature.

8.3. Test Results

The E.U.T met the requirements of Part 15 Subpart C, Section 225(e) specification.

The frequency offset between the frequency measured under extreme conditions and the nominal carrier frequency measured under normal test conditions, is in the worst case, 1 kHz at -10 °C (spec: +/-1.356 kHz).

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

TEST PERSONNEL:

Tester Signature: _____ Date: 23.07.13

Typed/Printed Name: A. Sharabi



Frequency Tolerance

E.U.T Description VPOS Smart Reader Model Number NAYAXVPOSR5 Part Number: Not Designated

Specification: FCC Part 15 Subpart C Section 15.225(e)

Temperature	Voltage	Measured Carrier Frequency	Nominal Carrier Frequency	Δ	Specificatiom	Pass/Fail
(°C)	(VDC)	(MHz)	(MHz)	(kHz)	(kHz)	
+25	12	13.55863	-	-	-	-
-20	14	13.55854	13.55863	-0.09	+/-1.356	Pass
-20	10	13.55854	13.55863	-0.09	+/-1.356	Pass
+55	14	13.55863	13.55863	0.00	+/-1.356	Pass
+55	10	13.55863	13.55863	0.00	+/-1.356	Pass

Figure 8. Frequency Error

8.4. Test Instrumentation Used, Frequency Tolerance

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Environmental Chamber	THERMOTRO N CORP	SM 32C Mini Max	25-1030	February 23, 2012	1 Year
Digital Voltage Meter	Escort	EDM1111A	10313121	December 7, 2010	2 Years
Variable Voltage Transformer	Variac Voltage Co.	-	-		N/A
Spectrum Analyzer	HP	8594E	3809U03785	February 28, 2012	1 Year



9. APPENDIX A - CORRECTION FACTORS

9.1. Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FRQ	S.G.	REF	Α	
			AMP	
10K	-30	-29.8	-30.2	0.4
15K	-30	-29.5	-29.7	0.2
20K	-30	-29.7	-29.9	0.2
30K	-30	-29.6	-29.9	0.3
50K	-30	-29.7	-30.0	0.3
75K	-30	-29.7	-30.0	0.3
100K	-30	-29.8	-30.0	0.2
150K	-30	-29.8	-30.0	0.2
200K	-30	-29.9	-30.2	0.3
500K	-30	-29.9	-30.3	0.4
1M	-30	-30.1	-30.5	0.4
1.5M	-30	-30.1	-30.6	0.5
2M	-30	-30.2	-30.7	0.5
5M	-30	-30.3	-30.9	0.6
10M	-30	-30.2	-31.0	0.8
15M	-30	-30.2	-31.1	0.9
20M	-30	-30.5	-31.3	0.8

-30		AMP	
-30		AIVIP	
50	-30.5	-31.7	1.2
-30	-30.5	-32.2	0.7
-30	-30.4	-32.5	2.1
-30	-30.5	-32.8	2.3
-30	-30.4	-33.3	2.9
-30	-30.5	-34.3	3.8
-30	-30.7	-35.3	4.8
-30	-30.9	-36.3	5.4
-15	-15.7	-22.4	6.7
-15	-15.9	-24.9	9.0
-15	-16.3	-25.7	9.4
-15	-16.5	-26.4	9.9
-15	-16.7	-26.9	10.2
-15	-16.3	-27.5	11.2
-15	-16.6	-28.7	12.1
-15	-16.8	-29.9	13.1
-15	-17.6	-31.1	13.5
-15	-17.2	-31.7	14.5
	-30 -30 -30 -30 -30 -15 -15 -15 -15 -15 -15 -15	-30	-30 -30.5 -32.2 -30 -30.4 -32.5 -30 -30.5 -32.8 -30 -30.4 -33.3 -30 -30.5 -34.3 -30 -30.7 -35.3 -30 -30.9 -36.3 -15 -15.7 -22.4 -15 -15.9 -24.9 -15 -16.3 -25.7 -15 -16.5 -26.4 -15 -16.7 -26.9 -15 -16.3 -27.5 -15 -16.6 -28.7 -15 -16.8 -29.9 -15 -17.6 -31.1

NOTES:

- 1. The cable type is SPUMA400 RF-11N(X2) and 39m long
- 2. The cable is manufactured by Huber + Suhner



9.2. Correction factors for Bilog ANTENNA

Model: 3142

Antenna serial number: 1250

3 meter range

FREQUENCY	AFE	FREQUENCY	AFE
(MHz)	(dB/m)	(MHz)	(dB/m)
30	18.4	1100	25
40	13.7	1200	24.9
50	9.9	1300	26
60	8.1	1400	26.1
70	7.4	1500	27.1
80	7.2	1600	27.2
90	7.5	1700	28.3
100	8.5	1800	28.1
120	7.8	1900	28.5
140	8.5	2000	28.9
160	10.8		20.7
180	10.4		
200	10.5		
250	12.7		
300	14.3		
400	17		
500	18.6		
600	19.6		
700	21.1		
800	21.4		
900	23.5		
1000	24.3		
1000	24.3		



9.4. Correction factors for Horn ANTENNA

Model: 3115

Antenna serial number: 6142

3 meter range

FREQUENCY	Antenna Factor	FREQUENCY	Antenna Factor
(MHz)	(dB/m)	(MHz)	(dB/m)
1000	23.9	10500	38.4
1500	25.4	11000	38.5
2000	27.3	11500	39.4
2500	28.5	12000	39.2
3000	30.4	12500	39.4
3500	31.6	13000	40.7
4000	33	14000	42.1
4500	32.7	15000	40.1
5000	34.1	16000	38.2
5500	34.5	17000	41.7
6000	34.9	17500	45.7
6500	35.1	18000	47.7
7000	35.9		
7500	37.5		
8000	37.6		
8500	38.3		
9000	38.5		
9500	38.1		
10000	38.6		



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

	Magnetic	Electric
FREQUENCY	Antenna	Antenna
	Factor	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



10. Comparison Industry Canada Requirements With FCC Requirements

Test	FCC	IC
Frequency Tolerance	47CFR15.225(e)	RSS 210 Issue 8 Section 2.5
		Annex 2 A2.6
Max Transmitting Power	47CFR15.225(a)	RSS 210 Issue 8 A8.4(1)
Spurious Emission	47CFR15.225(d)	RSS 210 Issue 8 A8.4(1)