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DATE: 11 June 2014

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

CE Radio Test Report

(R&TTE Directive)

for

Pointer Telocation Ltd.

Equipment under test:

Cellocator Cello

Cello-CANiQ (3G) P/N CT78000140-000

Written by: _____
R. Pinchuck, Documentation

Approved by: _____
A. Sharabi, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

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1. General Information

1.1 Administrative Information

Manufacturer:	Pointer Telocation Ltd.
Manufacturer's Address:	14 Hamelacha St., Rosh Ha'ayin, 48091 Israel Tel: +972-3-572-3111 Fax: +972-3-572-3100
Manufacturer's Representative:	Itamar Gohary
Equipment Under Test (E.U.T):	Cellocator Cello
Equipment Model No.:	Cello-CANiQ (3G) P/N CT78000140-000
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	30.03.2014
Start of Test:	31.03.2014
End of Test:	31.03.2014
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	See Section 2

1.2 Abbreviations and Symbols

The following abbreviations and symbols are applicable to this test report:

A/m	ampere per meter
AC	alternating current
AM	amplitude modulation
ARA	Antenna Research Associates
Aux	auxiliary
Avg	average
CDN	coupling-decoupling network
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dbµV	decibel referred to one microvolt
dbµV/m	decibel referred to one microvolt per meter
DC	direct current
EFT/B	electrical fast transient/burst
EMC	electromagnetic compatibility
ESD	electrostatic discharge
E.U.T.	equipment under test
GHz	gigahertz
HP	Hewlett Packard
Hz	Hertz
kHz	kilohertz
kV	kilovolt
LED	light emitting diode
LISN	line impedance stabilization network
m	meter
mHn	millihenry
MHz	megahertz
msec	millisecond
N/A	not applicable
per	period
QP	quasi-peak
PC	personal computer
RF	radio frequency
RE	radiated emission
sec	second
V	volt
V/m	volt per meter
VRMS	volts root mean square

1.3 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.

2. Applicable Documents

2.1	**R&TTE Directive: 1999**	*DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity*
2.2	**EN 300 440-2 V1.4.1 (2010-08)**	*Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive*
2.3	**EN 300 440-1 V1.6.1 (2010-08)**	*Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive*

3. Test Site Description

3.1 Location

The Electromagnetic Compatibility Test Facility of I.T.L. (PRODUCT TESTING) LTD. is located at Kfar Bin Nun, Israel 99780

Telephone: + 972-8-9797799, Fax: + 972-8-9797702

3.2 Shielded Room

A Modular Shielded Room, Type S81, manufactured by Rayproof, consisting of a Main Room and a Control Room.

The dimensions of the Main Room are: length: 7.4 m, width: 4.35 m, height: 3.75 m.

The dimensions of the Control Room are: length: 3.12 m, width: 2.5 m, height: 2.5 m.

The shielding performance is:

magnetic field: 60 dB at 10 kHz rising linearly to 100 dB at 100 kHz,
electric field: better than 110 dB between 50 MHz and 1 GHz,
plane wave: 110 dB between 50 MHz and 1 GHz.

All the power lines entering both shielded rooms are filtered.

3.3 Open Test Site

Consists of 3 meter and 10 meter ranges, using a 7x14 meter solid metal ground plane, a remote controlled turntable and an antenna mast. The turntable and the tested equipment that is placed on it are environment protected. All the power, control and signal lines are routed under the ground plane.

3.4 Antenna Mast

Type AAM-4/A, manufactured by Antenna Research Associates (ARA). The antenna position and polarization are remotely controlled via Fibre Optical Link using ARA Dual Controller Type ACU-2/5, and pressurized air.

The antenna position is adjustable between 1-4 meters.

3.5 Turntable

Type ART-1001/4, manufactured by ARA. The position of the turntable is remotely controlled via a Fibre Optic Link, using ARA Dual Controller Type ACU-2/5. The turntable is mounted in a pit and its surface is flush with the Open Site Ground Plane.

3.6 EMI Receiver

Type HP8542E, including HP85420E R.F. filter manufactured by Hewlett-Packard, being in full compliance with CISPR 16 requirements.

3.7 Test Equipment

See details in Section 6.

4. Summary of Test Results

Test	Results
Receiver Spurious Emission EN 300 440-2 V1.4.1: 2010 Section 5.4.3 EN 300 440-1 V1.6.1:2010 Section 8.3	The E.U.T met the performance requirements of the specification.

5. Equipment Under Test (E.U.T.) Description

The Cello-CANiQ addresses the mid and high-end segments of fleet management products for various advanced applications concerned with vehicle, driver and logistics management.

The Cello-CANiQ allows connectivity with various vehicle environment interfaces, including standard CANBUS and OBD interfaces, driver Identification, serial communication interfaces with 3rd party devices, discrete, analog and frequency measurement ports, voice channel, DTCO and others. All these interfaces are developed and configured for maximum flexibility in data aggregation, filtering, processing and reporting in a way which enables development of future applicative add-ons.

The Cello-CANiQ provides modular and scalable HW options ("peripherals ready" such as SD card, DTCO D8 connectivity and multiple communication technology support) as well as a highly flexible and configurable infrastructure for easy programming of the requested triggering, reaction and messaging scheme as a function of complex array of inputs received from the vehicle bus.

The Cello-CANiQ lays the infrastructure for the provisioning of field engineering services and professional services aimed at solving customer needs or market problems in short time and minimum resources.

The Cello-CANiQ supports DIRECT connectivity to vehicle data buses supporting J1939 or ISO-15765 via OBDII connector. HW form and fit are not changed and the enclosure and connectors look similar to other Cello family devices. Nevertheless, this product features a few important enhancements and improvements, such as HW compatibility with 3G modems, GPS & Glonass Hybrid positioning engine and other infrastructure changes and enablers, as described in the following sections.

The E.U.T. includes a GSM modem with FCC and IC modular approval.

6. List of Test Equipment

6.1 Radio Tests

The equipment indicated below by an "X" was used for testing according to EN 300 440-1 V1.6.1:2010, Section 8.3.

Test equipment calibration is in accordance with ITL Q.A. Procedure PM 110 "Calibration Control Procedure", which complies with ISO 9002 and ISO/IEC Guide 17025.

Instrument	Manufacturer	Model	Serial No.	Used in Test
				8.3
Dipole Antenna Set	CDI	A100	597	X
Spectrum Analyzer	HP	8592L	3826A01204	X
LISN	Fischer	FCC-LISN-2A	127	
LISN	Fischer	FCC-LISN-2A	128	
Spectrum Analyzer	HP	8591E	3414U01226	X
RF Amplifier	HP	8447F	3113A04961	
Close Field Probe	HP	HP11941A	2807A03046	
Close Field Probe	HP	HP11940A	2650A04587	
Receiver	HP	85420E/85422E	3427A00103/34	X
Antenna - Biconical	ARA	BCD-235/B	1041	X
Antenna - Log Periodic	A.H..Systems, Inc.	SAS-200/511	253	X
Antenna - Log Periodic	ARA	LPD-2010/A	1038	X
Antenna Mast	ARA	AAM-4A		X
Turntable	ARA	ART-1001/4		X
Mast & Table Controller	ARA	ACU-2/5	1001	X
Standard Impedance Network	Xitron	2520	7002	
Power Analysis System	Xitron	2503A	2005	
AC Power Source	Behlman	ACP		
CDN Network	FCC	FCC-801-T4	64	
CDN Network	FCC	FCC-801-T2	60	
Current probe	FCC	F42		
Double Ridge Guide	EMCO	3102	2052	X

7. E.U.T. Mode of Operation

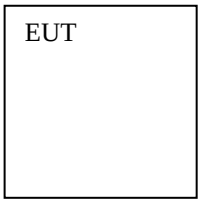

Figure 1. Test Setup

8. Receiver Spurious Emissions

8.1 Test Specification

EN 300 440-2 V1.4.1: 2010, Section 5.4.3
EN 300 440-1 V1.6.1: 2010, Section 8.3

8.2 Test Procedure

The test was performed in the frequency band 30MHz –15GHz.

The E.U.T. was placed on a non-conductive support, 1.5m above the ground plane.

At each emission frequency, the E.U.T. was rotated 360° in the horizontal plane until the maximum, level was measured and the height of the test antenna was also adjusted for maximum level.

The E.U.T. was replaced by a substitution antenna (*). The substitution antenna was driven by a signal generator operating in C.W. Mode. The height of the test antenna was adjusted for maximum level.

The EMI receiver was operated with 100 kHz resolution bandwidth and 300 kHz video bandwidth below 1GHz, and 1MHz above 1GHz.

The input signal of the substitution antenna was adjusted to the level that produced a receiver reading equal to the level noted while the spurious emissions of the E.U.T. were measured.

The above tests were performed in both horizontal and vertical polarizations.

The transmitter was set to the lowest operating frequency and to the highest operating frequency. These settings also apply to standby mode where applicable.

The spurious emission was calculated as follows:

Signal Generator Level (dBm) – Cable Loss (dB) + Substitution Antenna

Gain (dB).

The test set-up utilized for this specification is shown in the photograph, Figure 22 Spurious Emission (Transmitter) Test.

* A dipole antenna was used for frequencies up to 1 GHz and a horn antenna was used for frequencies above 1 GHz.

8.3 Test Results

The E.U.T met the requirements of EN 300 440-2 V1.4.1: 2010, Section 5.4.3 and EN 300 440-1 V1.6.1: 2010, Section 8.3.

Additional information of the results is given in *Figure 2*.

Receiver Spurious Emissions (Radiated)

E.U.T Description	Cellocator Cello
Type	Cello-CANiQ (3G) P/N CT78000140-000
Serial Number:	Not designated

Specification: EN 300 440-2 V1.4.1: 2010, Section 5.4.3;
EN 300 440-1 V1.6.1: 2010, Section 8.3

Antenna Distance: 3 meters Operating Frequency: Center

Frequency (MHz)	E (dBµV/m)	Antenna Pol. (H/V)	Power Output Generator (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Spec. (dBm)	Margin (dB)
37.4	26.5	V	-68.81	0.7	1.35	-66.01	-57.0	-9.01
39.7	28.2	V	-67.11	0.7	1.35	-64.31	-57.0	-7.31
42.9	31.6	V	-64.29	0.8	1.69	-61.25	-57.0	-4.25
37.4	29.8	H	-65.51	0.7	1.35	-62.71	-57.0	-5.71
39.7	26.2	H	-69.11	0.7	1.35	-66.31	-57.0	-9.31
42.9	30.0	H	-65.89	0.8	1.69	-65.85	-57.0	-8.85

Figure 2. Receiver Spurious Emissions Receiver

Note: Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

9. Set Up Photographs

Figure 3 Spurious Emission (Rx) Test

10. Signatures of the E.U.T's Test Engineers

Test	Test Engineer Name	Signature	Date
Receiver Spurious Emission	A. Sharabi		26.06.14

11. APPENDIX A - CORRECTION FACTORS

11.1 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".*

11.2 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.

11.3 Correction factors for CABLE

from EMI receiver to test antenna

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.2
20.0	0.2
30.0	0.2
40.0	0.2
50.0	0.3
60.0	0.4
70.0	0.4
80.0	0.4
90.0	0.5
100.0	0.5
150.0	0.6
200.0	0.6
250.0	0.7
300.0	0.8
350.0	0.9
400.0	1.0
450.0	1.1
500.0	1.2
600.0	1.3
700.0	1.4
800.0	1.4
900.0	1.5
1000.0	1.5

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	1.6
1400.0	1.8
1600.0	2.1
1800.0	2.2
2000.0	2.3
2300.0	2.8
2600.0	2.7
2900.0	3.1

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 5.5 meters.

11.4 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".

11.5 Correction factors for CABLE

RG-8
at 10 meter range.

FREQUENCY (GHz)	CABLE LOSS (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
13.0	6.0

11.6 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".*

11.7 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".

11.8 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".

11.9 Correction factors for BICONICAL ANTENNA

Type BCD-235/B,
10 meter range

FREQUENCY (MHz)	AFE (dB/m)
30.0	12.1
40.0	10.6
50.0	10.6
60.0	8.9
70.0	8.5
80.0	9.6
90.0	9.4
100.0	9.6
110.0	10.3
120.0	10.7
130.0	12.6
140.0	12.7
150.0	12.7
160.0	13.8
170.0	13.7
180.0	14.9
190.0	13.4
200.0	13.1
210.0	14.0
220.0	14.5
230.0	15.8
240.0	16.0
250.0	16.6
260.0	16.7
270.0	18.3
280.0	18.5
290.0	19.3
300.0	20.9

NOTES:

1. *Antenna serial number is 1041.*
2. *The above list is located in file 41BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".*

11.10 Correction factors for BICONICAL ANTENNA

Type 3109, 1.0 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	11.1
30.0	12.0
40.0	12.0
50.0	11.4
60.0	10.3
70.0	10.7
80.0	8.3
90.0	9.0
100.0	10.0
110.0	11.6
120.0	13.6
130.0	14.2
140.0	13.5
150.0	12.7
160.0	12.7
170.0	13.6
180.0	15.3
190.0	14.6
200.0	14.7
210.0	15.3
220.0	15.8
230.0	17.0
240.0	18.0
250.0	18.1
260.0	18.0
270.0	17.5
280.0	18.2
290.0	19.7
300.0	21.8

NOTES:

1. Antenna serial number is 3244.

2. The above list is located in file 44BIC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

11.11 Correction factors for BICONICAL ANTENNA

Type 3109,
3 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	18.4
30.0	14.0
40.0	12.3
50.0	10.6
60.0	8.3
70.0	8.7
80.0	7.2
90.0	8.6
100.0	10.1
110.0	11.2
120.0	11.8
130.0	12.3
140.0	12.7
150.0	12.5
160.0	12.4
170.0	12.1
180.0	12.2
190.0	12.8
200.0	13.7
210.0	14.5
220.0	15.4
230.0	15.9
240.0	16.3
250.0	16.7
260.0	17.1
270.0	17.2
280.0	17.5
290.0	18.1
300.0	18.9

NOTES:

1. Antenna serial number is 3244.

2. The above list is located in file 44BIC3M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

11.12 Correction Factors for Double-Ridged Waveguide Horn

Model: 3115
at 1 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)
1.0	25.0
2.0	28.0
3.0	29.0
4.0	33.0
5.0	34.0
6.0	34.9
7.0	36.0
8.0	37.0
9.0	38.0
10.0	39.5
11.0	39.0
12.0	39.5
13.0	40.0
14.0	42.0
15.0	39.8
16.0	38.5
17.0	41.0
18.0	46.5

FREQUENCY (GHz)	ANTENNA Gain (dB)
1.0	5.5
2.0	8.5
3.0	9.0
4.0	9.5
5.0	10.0
6.0	11.0
7.0	10.5
8.0	11.0
9.0	11.5
10.0	12.0
11.0	12.5
12.0	13.0
13.0	12.5
14.0	12.0
15.0	14.0
16.0	15.9
17.0	14.0
18.0	8.5

12. APPENDIX B - MEASUREMENT UNCERTAINTY

Occupied Channel Bandwidth	**$7.7*10.^{-8}$ up to 2.9 GHz and 1.2*10.-7 from 2.9GHz to 12.75GHz.**
RF output power, conducted	**± 25.53% or ±0.99dB, Up to 2.9GHz and ± 26.91% or ±1.03dB from 2.9GHz to 12.75GH**
Power Spectral Density, conducted	**± 25.53% or ±0.99dB, Up to 2.9GHz and ± 26.91% or ±1.03dB from 2.9GHz to 12.75GH**
Unwanted Emissions, conducted	**± 25.53% or ±0.99dB, Up to 2.9GHz and ± 26.91% or ±1.03dB from 2.9GHz to 12.75GH**
All emissions, radiated	**±4.58dB Up to 2.9GHz, and ±2.92dB from 2.9GHz to 12.75GHz**
Duty Cycle	**± 25.53% or ±0.99dB, Up to 2.9GHz and ± 26.91% or ±1.03dB from 2.9GHz to 12.75GH**