TIA/EIA/IS-968
(FCC PART 68)

LABORATORY
MEASUREMENT REPORT No. 10812

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INTRODUCTION

Test Site:

I.T.L (Product Testing) Ltd.
1 Bat Sheva St. POB 87, Lod 71100, Israel
TEL: 972-8-9153100
FAX: 972-8-9153101

Equipment Tested:

Manufacturer:	Attenti
Address:	Habarzel St. 2, POB 13236, Tel-Aviv 61131, Israel
Model or Part No.:	Smart Base Unit / 2Track base unit
Serial No.:	N/A
Date Submitted:	21.08.2011
Date Completed:	24.08.2011

Tested By:

Signature:

Name (please print): **S. Beloborodov**

Approved by:

Siganature:

Name (please print): **I. Cohen**

List of Appended Information

Appendix 1: ITL Equipment List

ITL	Instrument	Manufacturer	Model	Serial	CalDue
1040	DMM	Fluke	87	65290562	24/02/2013
1095	AC RMS Millivoltmeter	Leader	LM181A	1457533	23/02/2013
1096	Balance Analyser	CDI	BA-100	4130	27/02/2013
1097	Wide Band Receiver	CDI	WBR-100	3531	22/02/2012
1098	Network Analyser	CDI	NA-100	4129	27/02/2013
1099	AC Stress Analyser	CDI	HVC	3167	27/02/2013
1102	Filter	Krohn-Hite	3202	6638	23/02/2013
1116	Digital Oscilloscope	Tektronix	TDS210	B050825	22/02/2013
1147	Oscilloscope	Tektronix	TDS3012	B015205	24/12/2012
1264	Selective level meter	W & G	SPM-12	V-0047	24/02/2013
1265	level generator	W & G	PS-12	U-0090	24/02/2013
1073	Surge Generator	CDI	CDI 1000i	3153	15/03/2012

Remarks

The equipment list was attached to the report during the test

4.2 (68.302) Environmental Simulation

4.2.1 (68.302(a)) Shock (unpackaged)

Test Equipment:
Requirements: Unit shall not cause harm after drop shock.

Equipment category:

N/A	Hand-held items normally used at head height: **18** random drops from a height of 60 inches onto concrete covered with 1/8" asphalt tile or similar surface.

Notes: No such equipment

N/A	Table (desk) top equipment 0-5 kg: **6** random drops from a height of 30 inches onto concrete covered with 1/8" asphalt tile or similar surface.

Notes: No such equipment. Weight of unit > 0.7kg

4.2.2.1 (68.302(b)(1)) Telephone Line Surge – Type A. Metallic

Test Equipment: 1073

Two 800 Volt, 10 x 560 μsec surges, of alternate polarity were applied across the lead pairs indicated below.

Test Points Between	On-Hook		Off-Hook	
	Norm	Rev.	Norm	Rev.
Tip to Ring	Pass	Pass	Pass	Pass

Notes: No damage

4.2.2.2 (68.302(b)(2)) Telephone Line Surge – Type A. Longitudinal

Test Equipment: 1073

One of 1500 Volt surge of each polarity (10 x 160 μsec) was applied between the lead pairs listed below:

Test Points Between	On-Hook		Off-Hook	
	Norm	Rev.	Norm	Rev.
Tip & Ring to GND	NA	NA	NA	NA

Notes: No connection to Ground

4.2.3.1 (68.302(c)(1)) Telephone Line Surge – Type B. Metallic

Test Equipment: 1073

One of 1000 Volt, 9 x 720 μsec surge of each polarity was applied across the lead pairs indicated below.

Test Points Between	On-Hook		Off-Hook	
	Norm	Rev.	Norm	Rev.
Tip to Ring	Pass	Pass	Pass	Pass

Notes: No damage

4.2.3.2 (68.302(c)(2)) Telephone Line Surge – Type B. Longitudinal

Test Equipment: 1073

One of 1500 Volt surge of each polarity (9 x 720 μsec) was applied between the lead pairs listed below:

Test Points Between	On-Hook		Off-Hook	
	Norm	Rev.	Norm	Rev.
Tip & Ring to GND	NA	NA	NA	NA

Notes: No such connection

4.2.4 (68.302(d)) Power Line Surge

Test Equipment: 1073

Requirements: Unit shall not cause harm to the network after test.

NA	Not applicable to this unit
NA	Six 2500 Volt surges of alternate polarity (three surges of each polarity) were applied between the phase and neutral terminals of the input AC power line in all equipment states.

Notes: Unit powered by external power supply. External power supply adapter is not part of this investigation.

4.3 (68.304) Leakage Current Limitations

Test Equipment: 1093, 1099

Requirements: The leakage current shall not exceed 10mA peaks at any time during 90-second interval.

The unit was subjected to leakage tests. Listed below are the lead pairs selected and the currents measured. The highest of on-hook and off-hook readings are shown.

Lead categories:

(a) All telephone connections
(b) All power connections
(c) All possible combinations of exposed conductive surfaces on the exterior of such equipment, excluding
terminals for connection to other equipment
(d) All terminals for connection to registered protective circuitry or non-registered equipment
(e) All auxiliary lead terminals
(f) All E & M lead terminals
(g) PR/PC and CY1 and CY2 leads

Lead Pair	Category	AC Voltage (V)	Before ENV Stress Current (mA)	After ENV Stress Current (mA)
Telephone line	a	1500	0.5	0.52

Notes: The unit meets requirements

4.4.1.6 (68.306(a)(5)) Local Area Data Channel Interface (LADC)

Test Equipment:

NA

Not applicable to this unit

Parameter		Between T - R	Between T - Ground	Between R- Ground	For 4 Wire Interfaces		
					Between T_1- R_1	Between T_1- Ground	Between R_1 - Ground
1.	DC Current						
2.	AC Current						
3.	DC Volt	N/A			N/A		
4.	AC Peak	N/A			N/A		
5.	AC Peak & DC Volt	N/A			N/A		
6.	AC Peak with other interface leads shorted to ground	N/A			N/A		

Notes: _____

4.4.2 (68.306(b)(1) Physical Separation of Leads

Observations:

4.4.3 (68.306(b)(2), (3) (4) and (c)) Non-Hazardous Voltage Protection

Test Equipment:

NA

Not applicable to this unit

Terminal Connections	AC Voltage	Lead Pairs	Hazardous Voltage after 1 sec

Notes:

Non-Hazardous Voltage Connections: A voltage source is considered as non-hazardous according to 68.302 and 68.304 (b) requirement

4.5 (68.308) Signal Power Limitations

4.5.2.1 (68.308(b)(1)) Voiceband Metallic Signal Power (Voice Equipment)

Test Equipment: 1097, 1102, 1106

Requirements: The power of all signal energy in the 200-3995 Hz voiceband shall not exceed –9dBm.

Mode	Before ENV Stress Signal Level (dBm)	After ENV Stress Signal Level (dBm) (if different)
Connected	-12dBm	-12dBm
Disconnected	-11dBm	-11dBm

Notes:

4.5.2.2 (68.308(b)(2)) Voiceband Signal Power (Network Control Signals)

Test Equipment: 1097, 1102, 1106

Requirements: The maximum power of the frequency band below 3995 Hz signals delivered to a loop simulator circuit shall not exceed the following when averaged over any 3-second interval: 0dBm when used for network control (DTMF); -9dBm in all other cases.

Mode	Before ENV Stress Signal Level (dBm)	After ENV Stress Signal Level (dBm) (if different)
Connected	-14dBm	-14dBm
Disconnected	-18dBm	-18dBm

Notes: The unit meets requirements

4.5.2.3 (68.308(b)(4)) Voiceband Signal Power (Data Equipment)

Test Equipment: 1097, 1102, 1106

Data Equipment Type:
Requirements: Data circuit terminal equipment shall not transmit signals from 200 to 3995 Hz than exceed –9dBm, when averaged over any and all 3-second intervals.

NA	Fixed Loss Loop
NA	Permissive
P	Programmable (Signal Power Sheets Attached)

Mode	Before ENV Stress Signal Level (dBm)	After ENV Stress Signal Level (dBm) (if different)
Send data	-12dBm	-12dBm

Notes: Maximum level was recorded

4.5.2.6 Return loss test

Test Equipment: 1141

Requirements: For the two-wire interface: RL≥ 9-3log(f/200)/log(2.5)dB; for 200Hz ≤ f ≤ 500Hz
6dB; for 500Hz ≤ f ≤ 3200Hz

For the four-wire interface: RL≥ 3dB

Frequency Hz	2 wire interface		4 wire interface		Pass/Fail
	Measured	Criteria	Measured	Criteria	
200	9	9		3	Pass
300	9	7.7		3	Pass
400	10	6.7		3	Pass
500	9	6		3	Pass
1000	11	6		3	Pass
2000	9	6		3	Pass
3200	9	6		3	Pass

4.5.3 (68.308(c)) Signal Power in the 3995 - 4005 Hz Frequency Band

Test Equipment: : 1097, 1102, 1106

Requirements: Maximum power delivered by the sources in the 3995-4005 Hz band to an appropriate simulator circuit, shall be 18dB below maximum permitted power specified for the voice band.

-33 dBm	Permitted Power	-35.5 dBm	Measured Power in 3.8 kHz to 4.2 kHz band

The minimum ratio observed between maximum permitted power specified in 68.308(b) and the 4 kHz signals was 2.5dB over all modes

Notes: The unit meets requirements

4.5.5.1 (68.308(e)(1)) Metallic Voltage, 4 kHz to 6 MHz

Test Equipment: : 1097, 1102, 1106

Range	Before ENV Stress Level (dBV)	After ENV Stress Level (dBV) (if different)	Requirements Max. voltage, dBV
4 to 12 kHz	-33	-33	-17.78÷-20dBV
12 to 90 kHz	-37	-37.2	-20÷-55dBV
90 to 270 kHz	-60	-60	-55dB
270 kHz to 6 MHz	-40	-40	-15dBV

Notes: The unit meets requirements

4.5.4 (68.308(d)) Longitudinal Voltage at frequencies below 4kHz

Test Equipment: 1097, 1102, 1106

Worst-Case Operating Mode	Before ENV Stress Level (dBV)	After ENV Stress Level (dBV) (if different)	Requirements rms voltage
Off Hook			

Notes: No such equipment

4.5.5.2 (68.308(e)(2)) Longitudinal Voltage, 4 kHz to 6 MHz

Test Equipment: 1097, 1102, 1106

Range	Before ENV Stress Level (dBV)	After ENV Stress Level (dBV) (if different)	Requirements Max. voltage, dBV
4 to 12 kHz			-36.46÷-40dBV
12 to 42 kHz			-40.16÷-62dBV
42 to 270 kHz			-62dBV
270 kHz to 6 MHz			-30dBV

Notes: No such equipment

4.5.6 (68.308(f)) LADC interface
4.5.6.1 (68.308(f)(1)) Metallic voltages – frequencies below 4 kHz

Test Equipment: : 1097, 1102, 1106

NA

Max. voltage +3 dBV

NA

Not applicable to this unit

Range	Before ENV Stress Signal Level (dBm)	After ENV Stress Signal Level (dBm) (if different)

Notes: Not applicable to this unit

4.5.6.2 (68.308(f)(2)) Metallic voltages – frequencies above 4 kHz – LADC interface

Test Equipment: 1097, 1102, 1106

NA	Max. voltage in all 100-Hz bands –6 dBV
NA	Not applicable to this unit

Range	Before ENV Stress Signal Level (dBm)	After ENV Stress Signal Level (dBm) (if different)

Notes: Not applicable to this unit

4.5.6.3 (68.308(f)(3)) Longitudinal voltage– LADC interface

Test Equipment: 1095, 1097,

NA

Not applicable to this unit

Range	Before ENV Stress Signal Level (dBm)	After ENV Stress Signal Level (dBm) (if different)

Notes: Not applicable to this unit

4.6 (68.310) Transverse Balance Limitations
4.6.2 (68.310(b)) Analog voiceband equipment

Test Equipment: 1110, 1102, 1106

Longitudinal balance is shown below for both on-hook states. The off-hook measurements are taken with the loop simulator series resistance (and therefore loop current) varied through the full range, with the minimum level noted. Where environmental stress affects the readings by more than 2 dB, which is the measurement precision, both before and after values are shown.
Requirements: Off-hook balance 40dB in the voice band 200 – 4000Hz;
On-hook balance 60dB in the voice band 200 – 1000Hz and 40dB in the voice band 1000 – 4000Hz.

Frequency (Hz)	Balance (dB)			
	On-Hook		Off-Hook	
	Before ENV	After ENV	Before ENV	After ENV
200				
500				
1000				
2500				
4000				

Notes: No ground connection

4.7 (68.312) On-Hook Impedance limitations
4.7.2.1 (68.312(b)(1)) DC On-Hook Impedance

Test Equipment: 1093, 1098

Requirements: The DC resistance between tip and ring conductors, and between each of the tip and ring conductors and ground, shall be greater than 5 MΩ for all DC voltages up to and including 100 volts. The mentioned above resistance shall be greater than 30 kΩ for all DC voltages between 100 and 200 volts.

Voltage	Test Points	Before ENV Stress DC Current (mA)	After ENV Stress DC Current (mA) (if different)	DC Resistance (MΩ)
10	T to R	-	-	None
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
20	T to R	-	-	None
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
30	T to R	0.0035	-	8.5
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
40	T to R	0.0048	-	8.3
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
50	T to R	0.006	0.006	8.3
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
60	T to R	0.0072	0.008	8.3
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A

Notes: Unit is in Off hook state when voltage is below 23Vdc tip to ring. This is a feature of the unit.

4.7.2.1 DC On-Hook Impedance (cont'd)

Voltage	Test Points	Before ENV Stress DC Current (mA)	After ENV Stress DC Current (mA) (if different)	DC Resistance (MΩ)
70	T to R	0.0083	0.008	8.4
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
80	T to R	0.009	0.011	8.9
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
90	T to R	0.010	0.010	9.0
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
100	T to R	0.012	0.012	8.3
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A
200	T to R	0.024	0.024	8.3
	T to GND	N/A	N/A	N/A
	R to GND	N/A	N/A	N/A

Notes: Unit meets requirement

4.7.2 DC Current and AC Impedance (Loop-Start) During Simulated Ringing

Test Equipment: 1093, 1094, 1098

Requirements: During the application of simulated ringing:
The total DC current shall not exceed 3.0 mA.
The AC Impedance shall be greater than or equal to the value specified in Table 4.12.
Shown below are the frequencies and AC voltages used which yield maximum and minimum ringer equivalence:

Ringer Type	Frequency, (Hz)	Uac (V)	DC Current (mA)	AC Current (mA)	AC Impedance (KΩ)
A	20±3	40 to 130	0.1	1.2	108
A	30±3	40 to 130	0.3	1.1	118
B	15.3 to 34	40 to 130	0.3	1.1	118
B	>34 to 49	62 to 130	0.3	1.2	108
B	>49 to 68	62 to 150	0.3	0.2	750

Notes:

4.7.3.2 (68.312(b)(2)) (68.312(c)) AC Impedance During Simulated Ringing Impedance to Ground During Ringing

Test Equipment: 1093, 1094, 1098

☐

The impedance to ground during ringing exceeded ☐ kΩ on each lead

Notes: No such unit

4.7.5 (68.312(d)) Maximum Ringer Equivalence

Loop Start

DC REN per 68.312(d)(1)(i) is	3.0	Unit meets requirement
DC REN per 68.312(d)(1)(ii) is	0.02	Unit meets requirement
DC REN per 68.312(d)(1)(iii) is	0.5	Unit meets requirement
The highest DC REN is	3.0	Unit meets requirement
The AC REN per 68.312(d)(1)(iv) is	0.07B	Unit meets requirement

Ground Start

DC REN per 68.312(d)(2)(i) is	NA	Not applicable to this unit – Not Ground Start unit
AC REN per 68.312(d)(2)(ii) is	NA	Not applicable to this unit – Not Ground Start unit
The ringer equivalence is	3.0	Unit meets requirement

Comply with requirements

Notes:

4.8 (68.314) Billing Protection

4.8.1 (68.314(a)) Call Duration Requirements

Test Equipment: 1116

2 seconds	Delay between line seizure and data transfer
P	

Notes: Comply with requirements

4.8.2 (68.314(b)) Voice and Data equipment On-Hook Signal requirements

Test Equipment: 1106, 1097

Registered terminal equipment shall assure that, when an incoming telephone call is answered, the answering terminal equipment prevents both transmission and reception for at least 2 seconds after the answering terminal equipment transfers to the off-hook condition. The power delivered info a 2-wire loop simulator circuit or into the transmit and receive pair of a 4-wire loop simulator or into a 600 Ohm termination in the on-hook state, by loop-start or ground-start equipment shall not exceed **–55dBm** for the frequency band from 200 to 3200 Hz.

Measurement state	**Measured level**
On-hook	-60.0dBm
Transmit:	
Receive:	

Notes: Comply with requirements

4.8.3 (68.314(c)(1)) Voice and Data equipment loop current requirements for equipment connected to the Public Switched Network

Test Equipment: 1093, 1097

The line was seized with [ ] % overshoot

OR

[√] Passed 200Ω Test
Current drawn by EUT greater than that drawn by 200Ω

P

Notes: Comply with requirements

4.8.4.1 (68.314(d)(1)) Signaling Interference requirements

Test Equipment: 1106, 1097, 1102

√

4.8.4.1 Energy in the 800 Hz to 2450 Hz band is greater or equal than the energy in the 2450 Hz to 2750 Hz band for all internally generated signals.

P

Comply with requirements

Test	Signal Level, dBm
800-2450 Hz band	-29
2450-2750 Hz band	-32

Appendix 1

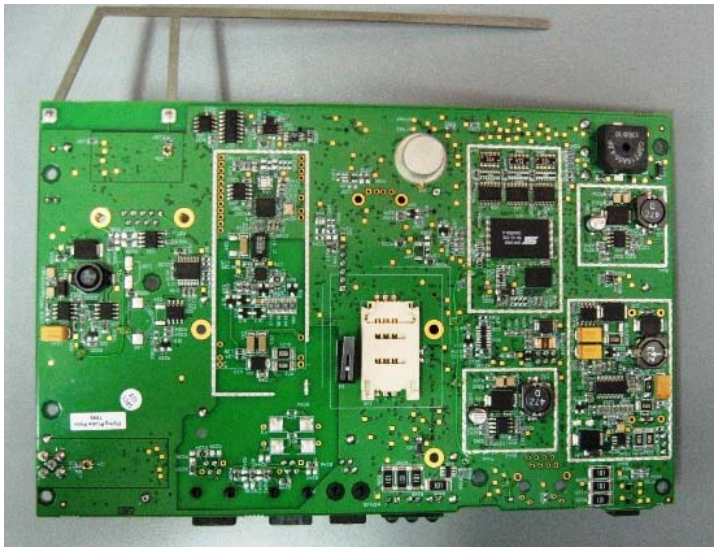
Photos

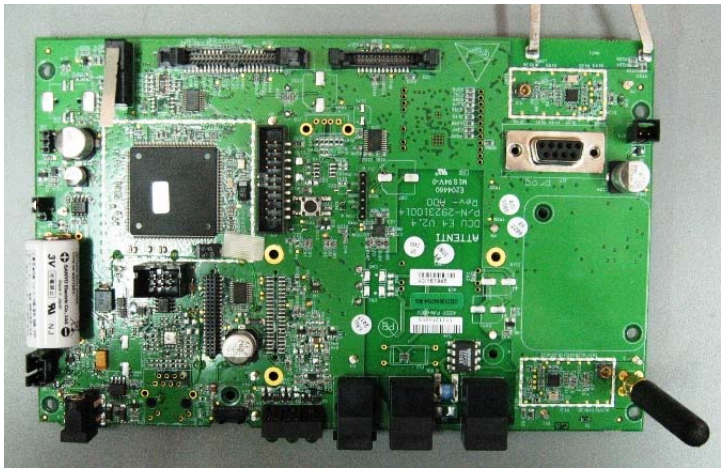












End of report