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**SENA**

Dates of Tests: August 13 ~ 14, 2007  
 Test Report S/N: LR500110708D  
 Test Site : LTA CO., LTD.

**CERTIFICATION OF COMPLIANCE**

FCC ID.

**S7APARANIMSP1000**

APPLICANT

**Sena Technologies, Inc.**

- FCC Classification** : **FHSS Sequence Spread Spectrum (FHSS)**
- Manufacturing Description** : **Bluetooth Access Point**
- Manufacturer** : **Sena Technologies, Inc.**
- Model name** : **Parani-MSP1000**
- Test Device Serial No.:** : **Identical prototype**
- Rule Part(s)** : **FCC Part 15.247 Subpart C; ANSI C-63.4-2003**
- Frequency Range** : **2402 ~ 2480MHz**
- Max. Output Power** : **14.63dBm - Conducted**
- Data of issue** : **August 17, 2007**

This test report is issued under the authority of:

The test was supervised by:

Dong -Min JUNG, Technical Manager

Kyung-Taek LEE, Test Engineer

**This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.**



NVLAP LAB Code.: 200723-0

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## 1. General information's

### 1-1 Test Performed

Company name : LTA Co., Ltd.  
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822  
 Web site : <http://www.ltalab.com>  
 E-mail : [chahn@ltalab.com](mailto:chahn@ltalab.com)  
 Telephone : +82-31-323-6008  
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

### 1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2007-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2009-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2008-03-28	FCC filing
VCCI	JAPAN	R2133, C2307	2008-06-22	VCCI registration
IC	CANADA	IC5799	2008-04-23	IC filing

## 2. Information's about test item

### 2-1 Applicant & Manufacturer

Company name : Sena Technologies, Inc.  
 Address : 210 Yangjae-dong Seocho-gu Seoul 137-130 Korea  
 TEL / FAX : +82-2-571-8283/ +82-2-573-7710

### 2-3 Equipment Under Test (EUT)

Trade name : Bluetooth Access Point  
 FCC ID : S7APARANIMSP1000  
 Model name : Parani-MSP1000  
 Serial number : Identification  
 Date of receipt : July 30, 2007  
 EUT condition : Production, not damaged  
 Antenna type : External antenna (M/N: R-AN2400-1901RS) Max Gain 5dBi  
                   External antenna (M/N: R-AN2400-5801RS) Max Gain 3.17dBi  
 Frequency Range : 2402 ~ 2480MHz  
 RF output power : 19.12dBm EIRP  
 Number of channels : 79  
 Channel spacing : 1MHz  
 Duty Cycle : 78 %  
 Channel Access Protocol : Frequency Hopping  
 Type of Modulation : GFSK, Pi/4 DQPSK, 8DPSK  
 Power Source : 230V, 50Hz by AC/DC Adaptor

### 2-3 Model Difference according to the number of RF Module

Model Number	The number of RF Module
Parani-MSP1000 A	1ea
Parani-MSP1000 B	2ea
Parani-MSP1000 C	4ea

### 2-5 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
PC	dx2200Microtower	CNG6500RX9	HP
Monitor	VS11353	E060T4021/1-1	View Sonic
Keyboard	SK-8115	641-OEWW	DELL
Mouse	MO56UO	510022473	DELL
Print	Deskjet 600K	SG7631B1XX	HP
-	-	-	-
-	-	-	-

### 3. Test Report

#### 3.1 Summary of tests

	Parameter	Limit	Test Condition	Status (note 1)
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#### I. FCC Part Section(s)

Bluetooth Module is certified by FCC(FCC ID: S7APARANIESD1000).

#### II. Additional items

15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.207	AC Conducted Emissions	EN 55022	Line Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

## 3.2 Technical Characteristics Test

### 3.2.1 Field Strength of Harmonics

#### Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

RBW = 100 kHz ( 30MHz ~ 1 GHz)

= 1 MHz (1 GHz ~ 10<sup>th</sup> harmonic )

Span = 100 MHz

Trace = max hold

VBW ≥ RBW

Detector function = peak

Sweep = auto

**Measurement Data: Complies**

#### Minimum Standard: FCC Part 15.109

Frequency (MHz)	Limit (uV/m) @ 10m
30 ~ 88	90 **
88 ~ 216	150 **
216 ~ 960	210 **
Above 960	300

\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

1. Measurement Data: other spurious



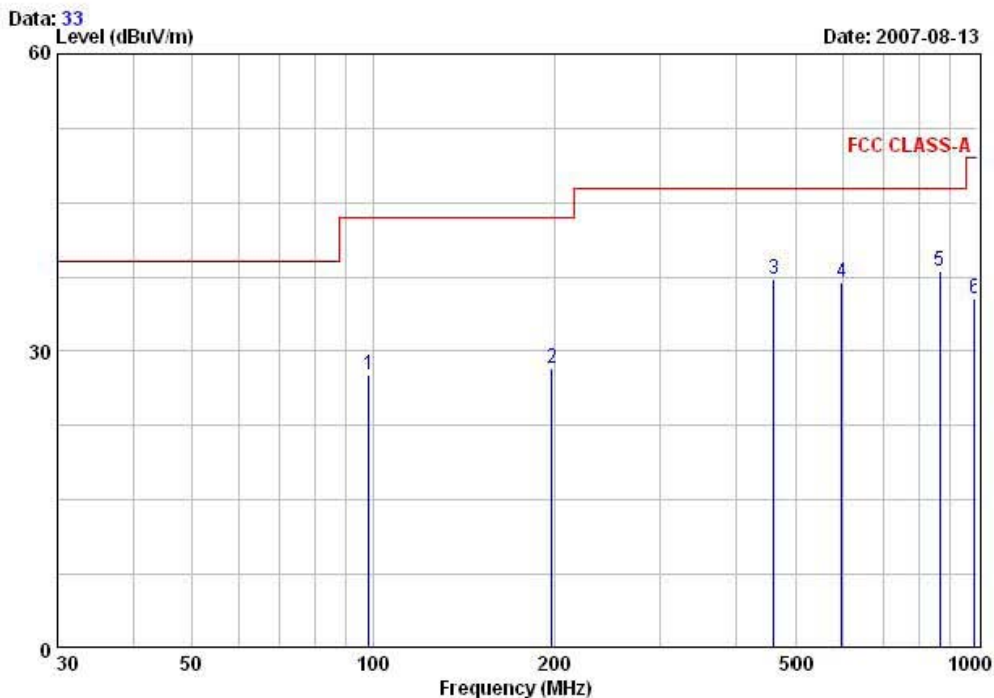
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EUT/Model No.: parani-MSP1000

TEST MODE: HYPER+PING mode

Temp Humi : 35 / 54

Tested by: B.S.KIM



	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
	MHz	dBuV	dB	QK dBuV/m	dBuV/m	dB	cm	deg	
1	98.38	43.20	-15.58	27.62	43.50	15.88	102	225	VERTICAL
2	198.04	42.00	-13.70	28.30	43.50	15.20	290	204	VERTICAL
3	462.12	43.20	-5.95	37.25	46.40	9.15	100	266	VERTICAL
4	595.80	39.60	-2.59	37.01	46.40	9.39	111	287	HORIZONTAL
5	864.99	36.10	2.05	38.15	46.40	8.25	125	320	VERTICAL
6	989.99	30.70	4.65	35.35	49.50	14.15	171	267	VERTICAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

### 3.2.2 AC Conducted Emissions

#### Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

#### Measurement Data: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.

#### Minimum Standard: FCC Part 15.107/EN 55022 Class A

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60

\* Decreases with the logarithm of the frequency



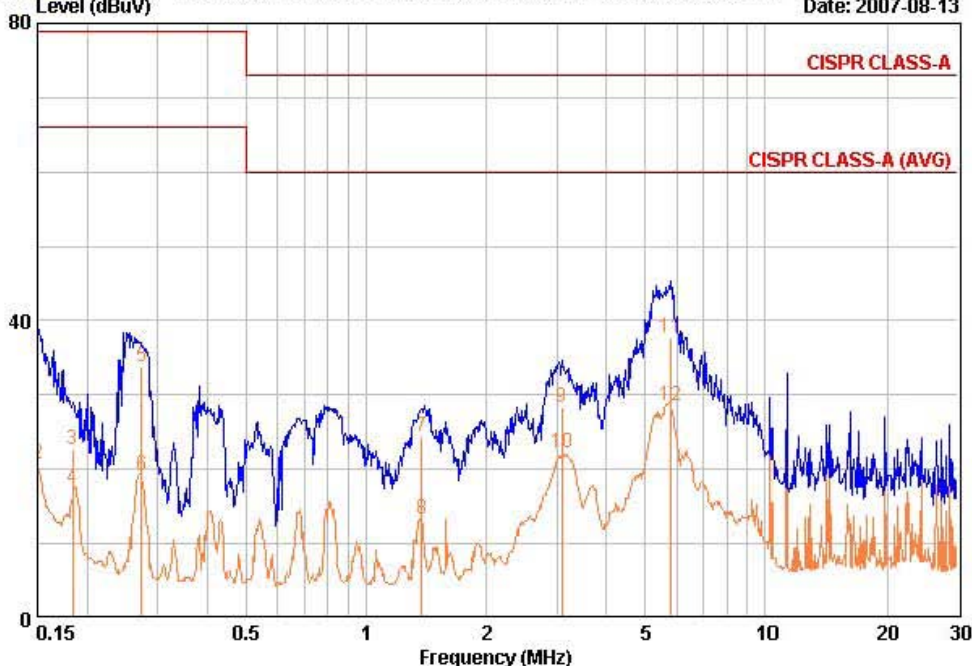
### AC Conducted Emissions –Line



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EUT / Model No. : parani-MSP1000	Phase : LINE
Test Mode : HYPER+PING mode	Test Power : 120 / 60
Temp./Humi. : 26 / 77	Test Engineer : B.S.KIM

Data: 242 File: E:\00\_e3 EMI DATA\2007\LTA\_Conduction\_0708\_1.EMI (242) Date: 2007-08-13



Freq MHz	RD		C.F	Result		Limit		Margin	
	QP dBuV	AV dBuV		QP dBuV	AV dBuV	QP dBuV	AV dBuV	QP dB	AV dB
0.150	31.50	20.20	0.59	32.09	20.79	79.00	66.00	46.91	45.21
0.184	22.30	17.20	0.31	22.61	17.51	79.00	66.00	56.39	48.49
0.273	33.60	18.90	0.26	33.86	19.16	79.00	66.00	45.14	46.84
1.376	24.10	13.00	0.36	24.46	13.36	73.00	60.00	48.54	46.64
3.093	27.70	21.50	0.65	28.35	22.15	73.00	60.00	44.65	37.85
5.804	37.20	28.00	0.58	37.78	28.58	73.00	60.00	35.22	31.42

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

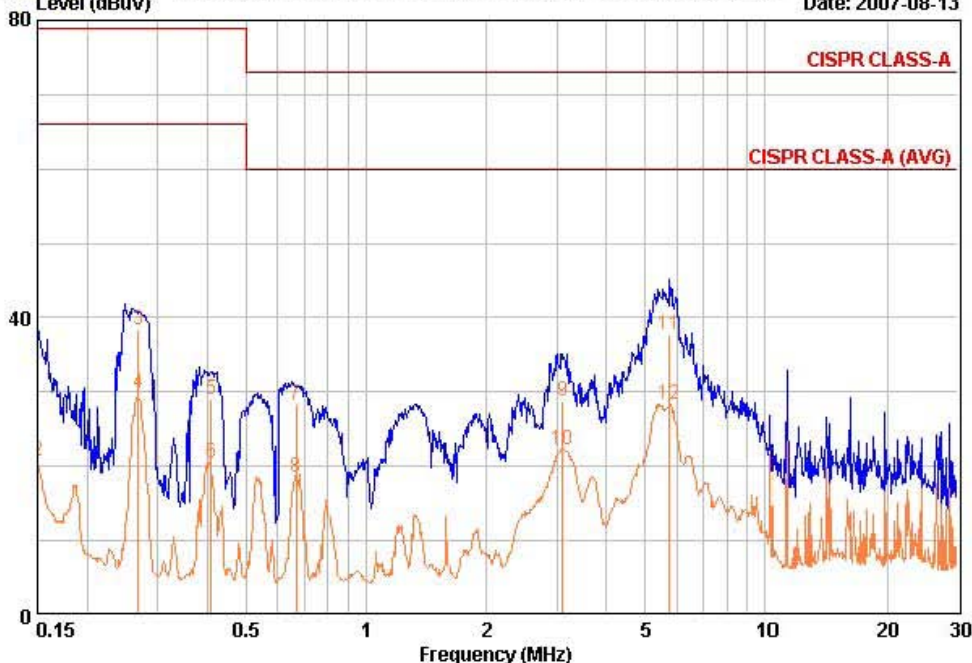
### AC Conducted Emissions –Neutral



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EUT / Model No. : parani-MSP1000	Phase : NEUTRAL
Test Mode : HYPER+PING mode	Test Power : 120 / 60
Temp./Humi. : 26 / 77	Test Engineer : B.S.KIM

Data: 240 Level (dBuV) File: E:\00\_e3 EMI DATA\2007\LTA\_Conduction\_0708\_1.EMI (240) Date: 2007-08-13



Freq MHz	RD		C.F	Result		Limit		Margin	
	QP dBuV	AV dBuV		QP dBuV	AV dBuV	QP dBuV	AV dBuV	QP dB	AV dB
0.150	31.30	20.10	0.57	31.87	20.67	79.00	66.00	47.13	45.33
0.268	38.10	29.60	0.24	38.34	29.84	79.00	66.00	40.66	36.16
0.408	28.70	20.20	0.36	29.06	20.56	79.00	66.00	49.94	45.44
0.667	28.00	18.20	0.28	28.28	18.48	73.00	60.00	44.72	41.52
3.108	28.10	21.70	0.62	28.72	22.32	73.00	60.00	44.28	37.68
5.745	37.20	27.90	0.53	37.73	28.43	73.00	60.00	35.27	31.57

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

## APPENDIX

### TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	8594E	3649A03649	HP	Apr-08
2	Signal Generator	8648C	3623A02597	HP	Apr-08
3	Attenuator (3dB)	8491A	37822	HP	Nov-07
4	Attenuator (10dB)	8491A	63196	HP	Nov-07
5	EMI Test Receiver	ESVD	843748/001	R&S	Jan-08
6	LISN	KNW-407	8-1430-1	Kyoritsu	Jan-08
7	Two-Line V-Network	ESH3-Z5	893045/017	R&S	Jan-08
8	RF Amplifier	8447D	2949A02670	HP	Jan-08
9	RF Amplifier	8447D	2439A09058	HP	Jan-08
10	RF Amplifier	8449B	3008A02126	HP	Apr-09
11	Test Receiver	ESHS10	828404009	R&S	Jan-08
12	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Jul-08
13	Log.-Per. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-09
14	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-09
15	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-09
16	Dipole Antenna	VHA9103	2116	Schwarzbeck	Nov-07
17	Dipole Antenna	VHA9103	2117	Schwarzbeck	Nov-07
18	Dipole Antenna	UHA9105	2261	Schwarzbeck	Nov-07
19	Dipole Antenna	UHA9105	2262	Schwarzbeck	Nov-07
20	Spectrum Analyzer	8591E	3649A05888	HP	Jan-08
21	Spectrum Analyzer	8563E	3425A02505	HP	Apr-08
22	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Feb-08
23	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	Jun-08
24	RF Switch	MP59B	6200414971	ANRITSU	Jun-08
25	RF Switch	MP59B	6200438565	ANRITSU	Jun-08
26	Power Divider	11636A	6243	HP	Nov-07
27	DC Power Supply	6622A	3448A03079	HP	Oct-07
28	Attenuator (30dB)	11636A	6243	HP	Nov-07
29	Frequency Counter	5342A	2826A12411	HP	Apr-08
30	Power Meter	EPM-441A	GB32481702	HP	Apr-08
31	Power Sensor	8481A	2702A64048	HP	Apr-08
32	Audio Analyzer	8903B	3729A18901	HP	Nov-07
33	Modulation Analyzer	8901B	3749A05878	HP	Nov-07
34	TEMP & HUMIDITY Chamber	YJ-500	L05022	JinYoung Tech	Oct-07
35	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-09