TEST REPORT

of

FCC Part 15 Subpart B&C §15.239

FCC ID : P47SOCN5S08

Equipment Under Test	:	Looket
Model Name	:	Portable GPS navigation device (the addition of model name : SOCN570, SOCN530, SOCN510)
Serial No.	:	N/A
Applicant	:	SysOnChip, Inc.
Manufacturer	:	SysOnChip, Inc.
Date of Test(s)	:	2008-04-29 ~ 2008-06-21
Date of Issue	:	2008-06-27

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date** **2008-06-27**

Geoffrey Do

Approved By **Date** **2008-06-27**

Jim Kim

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1. General information

1.1 Testing laboratory

SGS Testing Korea Co., Ltd.
- Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040
- 705, Dongchun-Dong Sooji-Gu, Yongin-Shi, Kyungki-Do, Korea.
www.electrolab.kr.sgs.com
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371

1.2 Details of applicant

Applicant	:	SysOnChip, Inc.
Address	:	4F., Singwan Bldg., KT Buk-Daejeon Branch, 138 Gajeong-dong, Yuseong-gu, Daejeon, 305-350, Korea
Contact Person	:	Heon-Il Ahn
Phone No.	:	+82 +42 864 4665
Fax No.	:	+82 +42 864 4664

1.3. Description of EUT

Kind of Product	Looket
Model Name	Portable GPS Navigation device (the addition of model name : SOCN570, SOCN530, SOCN510)
Serial Number	N/A
Power Supply	AC Adapter(AC 100 ~ 240 V), Cigar Jack(DC 12 V ~ 24 V), Lithium battery(3.7V)
Frequency Range	2402 MHz ~ 2480 MHz(Bluetooth) 88.1 MHz ~ 107.9 MHz (FM Transmitter)
Modulation Technique	GFSK, FM
Number of Channels	79 CH(Bluetooth), 204 CH(FM Transmitter),
Operating Conditions	-20℃ ~ 70℃
Antenna Type	Ceramic Patch ANT(GPS-Internal) Patch ANT(GPS-External) Chip ANT(Bluetooth and FM Transmitter)
Antenna Gain	2.51 dBi(Bluetooth)

▶ Difference: It is same as basic model except for UI concept according to buyer.

1.4. Details of modification

-N/A

1.5. Test equipment list

Equipment	Manufacturer	Model	Cal Due.
Signal Generator	Agilent	E4438C	May 09, 2009
Spectrum Analyzer	Agilent	E4440A	May 09, 2009
Spectrum Analyzer	Agilent	8565E	Dec. 31, 2008
DC Power Supply	Agilent	6674A	May 09, 2009
Two-Line V-Network	R&S	ENV216	Jan. 17, 2009
Test Receiver	R&S	ESPC	Jul. 25, 2008
Test Receiver	R&S	ESVS10	Mar. 21, 2009
Preamplifier	H.P.	8447F	Sep. 17, 2008
Ultra Broadband Antenna	R&S	HL562	Oct. 02, 2009
Shield Room	SY Corporation	L x W x H (6.5 m x 3.5 m x 3.5 m)	N/A
3 m Full Anechoic chamber	SY Corporation	L x W x H (9.6 m x 6.4 m x 6.4 m)	Feb. 15, 2009

1.6. Summary of test results

The EUT has been tested according to the following specifications:

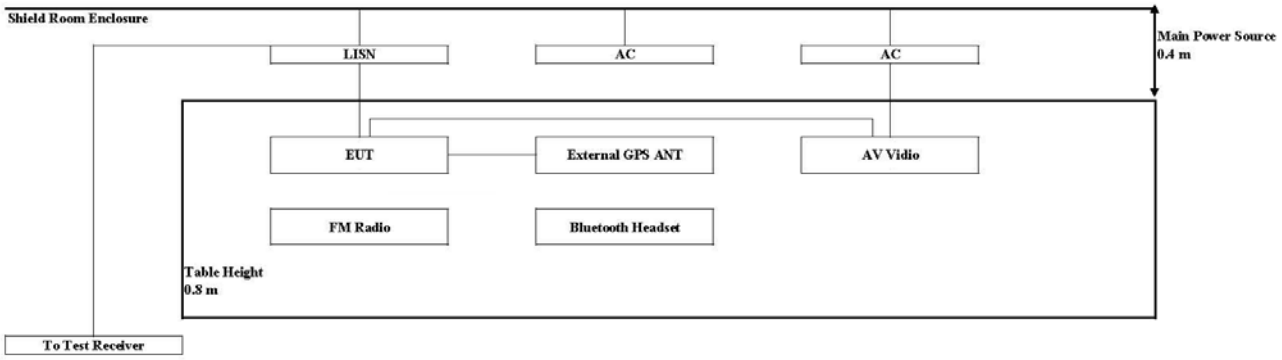
Applied Standard : FCC Part 15 Subpart B&C §15.239		
Standard section	**Test Item**	**Result**
15.207(a)	AC Power conducted emission	Complied
15.239(a)	20 dB bandwidth	Complied
15.239(b)	Field Strength (Fundamental)	Complied
15.205(a) 15.209(a)	Radiated Emission, Band Edge and Restricted Bands	Complied

1.7. Test report revision

Revision	Report number
0	F690501/RF-RTL002139

2. Conducted power line test

2.1. Test setup



2.2. Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network (LISN).
Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.50	66-56*	56-46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

* Decreases with the logarithm of the frequency.

2.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

The test procedure is performed in a 6.5m × 3.6m× 3.6m (L×W×H) shielded room. The EUT along with its peripherals were placed on a 1.0m(W)× 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

2.4. Test result

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : 21 ℃ Relative humidity : 45 %

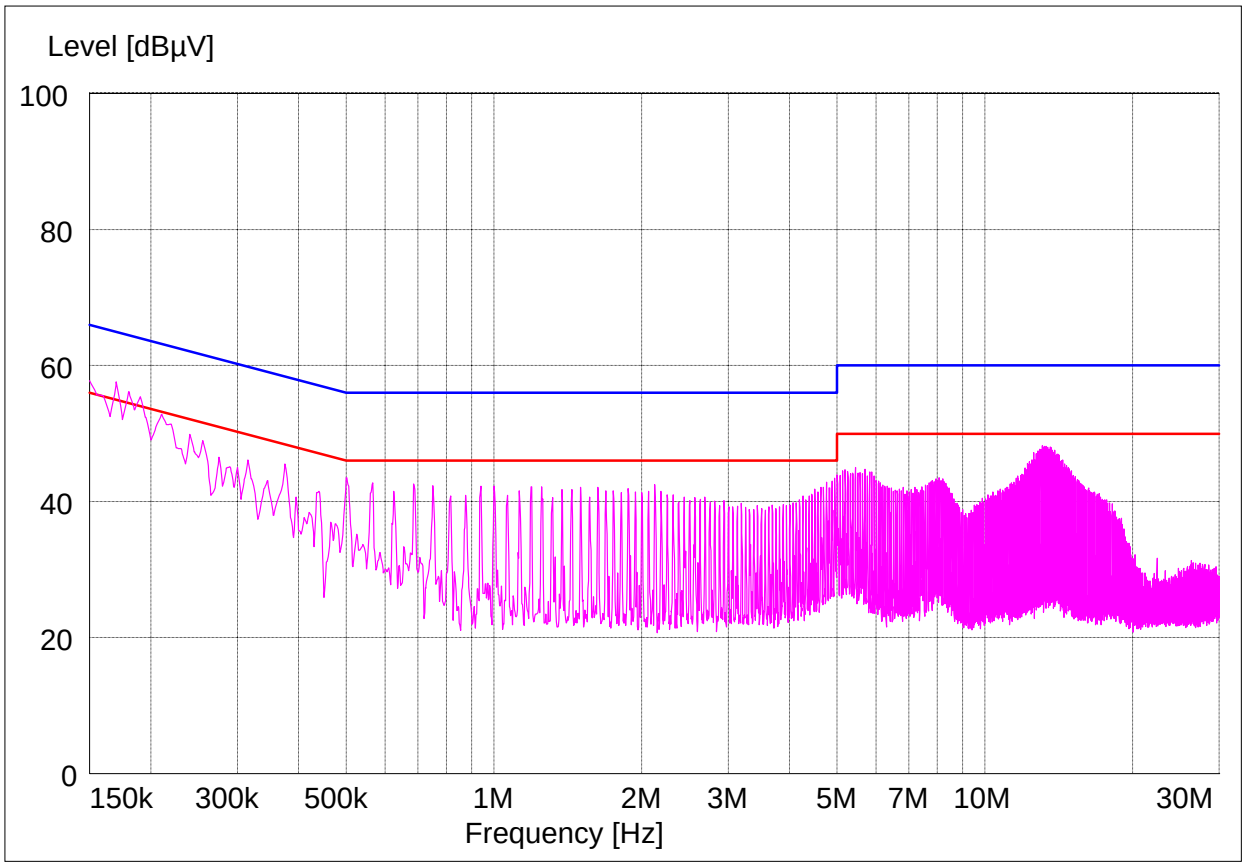
Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth 9 kHz

Freq.	Level(dBuV)		Line	Limit(dBuV)		Margin(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.19	45.80	27.70	H	66.00	56.00	20.20	28.30
0.38	41.70	20.10	H	64.96	54.96	23.26	34.86
0.82	40.60	39.70	H	58.39	48.39	17.79	8.69
4.89	42.50	42.10	H	56.00	46.00	13.50	3.90
8.09	38.30	30.30	H	60.00	50.00	21.70	19.70
14.17	28.50	22.20	H	60.00	50.00	31.50	27.80
0.15	52.00	45.20	N	64.04	54.04	12.04	8.84
0.17	44.50	43.50	N	58.39	48.39	13.89	4.89
0.38	43.40	42.90	N	56.00	46.00	12.60	3.10
0.50	38.80	30.30	N	56.00	46.00	17.20	15.70
5.45	36.50	26.60	N	60.00	50.00	23.50	23.40
13.08	23.70	17.60	N	60.00	50.00	36.30	32.40

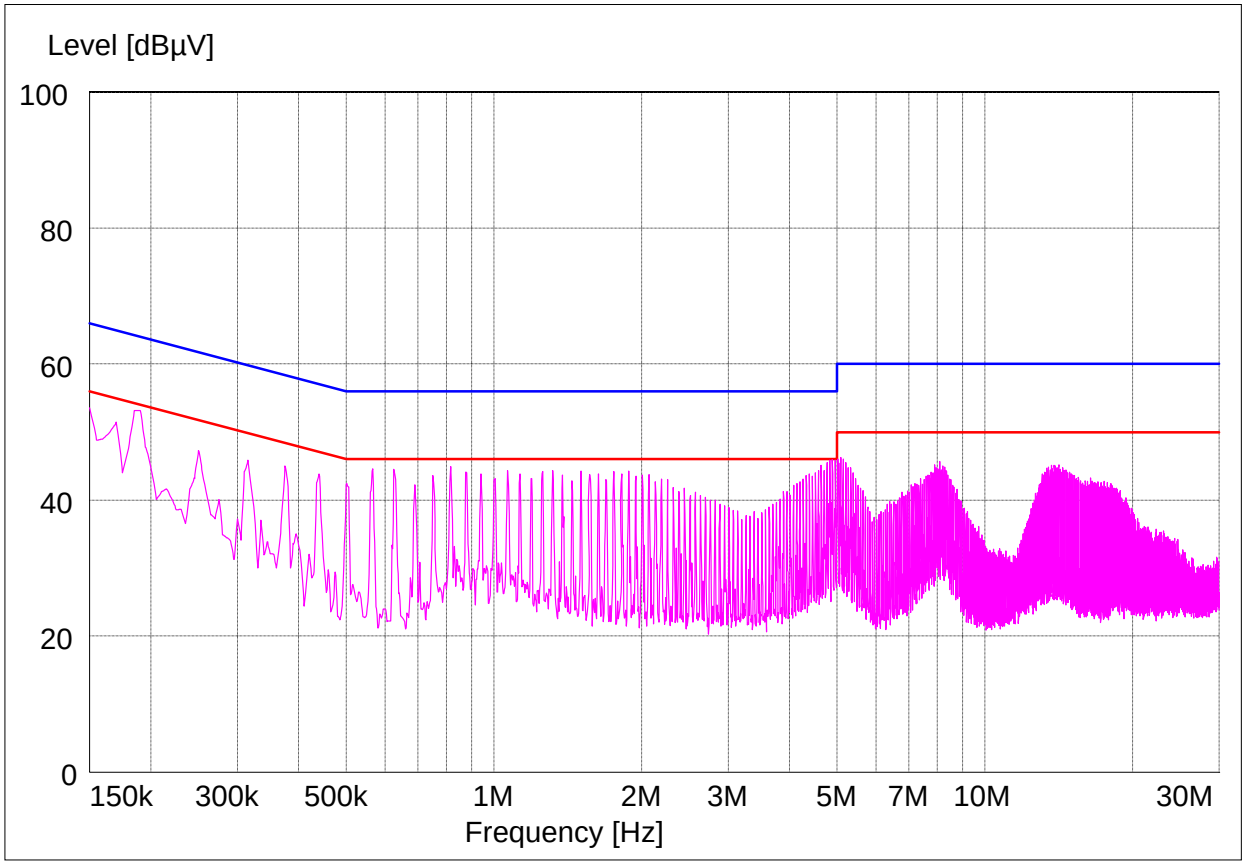
Note ;
Line (H) : Hot
Line (N) : Neutral

Plot of conducted power line

Test mode : (Hot)



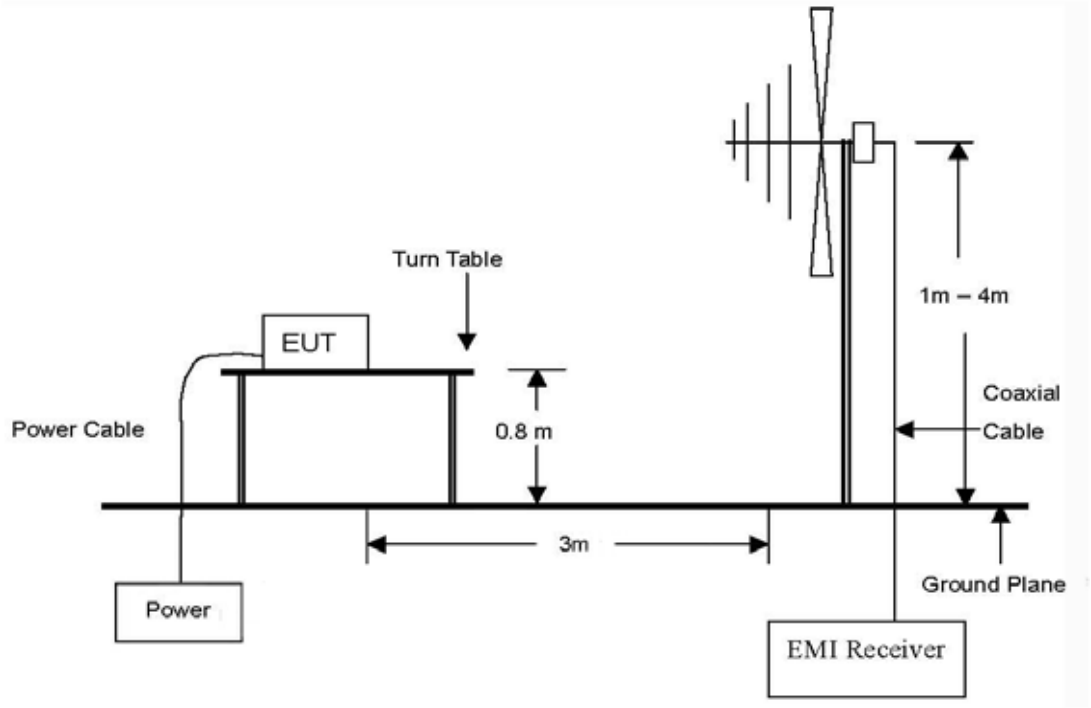
Test mode : (Neutral)



3. Radiated emission

3.1. Test setup for radiated emission.

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



3.2. Limit

The field strength of any emission within this band (section 15.239 frequency between 88 MHz –108 MHz) shall not exceed 250 microvolts /meter at 3 meters. (48dBV/m at 3m)
The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

The provisions in section 15.35 for limiting peak emissions apply. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit), as below.

Frequency (MHz)	Distance (Meters)	Field strength (dBμV/m)	Field strength (μV/m)
30 - 88	3	40.0*	100*
88 – 216	3	43.5*	150*
216 – 960	3	46.0*	200*
Above 960	3	54.0	500

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

3.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

3.3.1. Test procedures for spurious radiated emissions

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

Note ;

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.

3.4. Test Result

Ambient temperature : 21 ℃ Relative humidity : 47 %

3.4.1.1. Use AC adapter

a. 88.1 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
88.1	60.0	Q.P.	V	7.92	-26.64	41.28	48.00	6.72
40.40	52.10	Q.P.	V	14.06	-27.06	39.10	40.00	0.90
122.15	35.80	Q.P.	V	9.73	-26.13	19.40	43.50	24.10
151.25	37.10	Q.P.	V	7.77	-25.83	19.04	43.50	24.46
311.30	46.80	Q.P.	V	11.22	-24.76	33.26	46.00	12.74
500.45	44.50	Q.P.	V	15.33	-25.32	34.51	46.00	11.49
Above 550	Not Detected							

b. 98.9 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
98.9	60.2	Q.P.	V	9.10	-26.38	42.92	48.00	5.08
46.98	34.30	Q.P.	V	9.83	-26.98	17.15	40.00	22.85
301.45	28.00	Q.P.	V	10.92	-24.75	14.17	46.00	31.83
500.45	23.50	Q.P.	V	15.33	-25.32	13.51	46.00	32.49
Above 550	Not Detected							

c. 107.9 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
107.9	64.20	Q.P.	V	9.46	-26.28	47.38	48.00	0.62
49.40	52.60	Q.P.	V	8.29	-26.96	33.93	40.00	6.07
301.60	36.20	Q.P.	V	10.93	-24.75	22.38	46.00	23.62
500.45	42.20	Q.P.	V	15.33	-25.32	32.21	46.00	13.79
Above 550	Not Detected							

Remark:

1. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

3.4.1.2. Use cigar jack

a. 88.1 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
80.10	59.70	Q.P.	V	7.92	-26.64	40.98	48.00	7.02
40.40	51.80	Q.P.	V	14.06	-27.06	38.80	40.00	1.20
122.15	35.40	Q.P.	V	9.73	-26.13	19.00	43.50	24.50
151.25	36.90	Q.P.	V	7.77	-25.83	18.84	43.50	24.66
311.30	46.40	Q.P.	V	11.22	-24.76	32.86	46.00	13.14
500.45	44.10	Q.P.	V	15.33	-25.32	34.11	46.00	11.89
Above 550	Not Detected							

b. 98.9 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
98.9	60.10	Q.P.	V	9.10	-26.38	42.82	48.00	5.18
46.98	34.00	Q.P.	V	9.83	-26.98	16.85	40.00	23.15
301.45	27.80	Q.P.	V	10.92	-24.75	13.97	46.00	32.03
500.45	23.70	Q.P.	V	15.33	-25.32	13.71	46.00	32.29
Above 550	Not Detected							

c. 107.9 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
107.9	64.10	Q.P.	V	9.46	-26.28	47.28	48.00	0.72
49.40	52.80	Q.P.	V	8.29	-26.96	34.13	40.00	5.87
301.60	36.10	Q.P.	V	10.93	-24.75	22.28	46.00	23.72
500.45	42.10	Q.P.	V	15.33	-25.32	32.11	46.00	13.89
Above 550	Not Detected							

Remark:

1. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

3.4.1.3. Use battery

a. 88.1 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
88.1	59.70	Q.P.	V	7.92	-26.64	40.98	48.00	7.02
40.40	51.90	Q.P.	V	14.06	-27.06	38.90	40.00	1.10
122.15	35.70	Q.P.	V	9.73	-26.13	19.30	43.50	24.20
151.25	37.00	Q.P.	V	7.77	-25.83	18.94	43.50	24.56
311.30	46.50	Q.P.	V	11.22	-24.76	32.96	46.00	13.04
500.45	44.30	Q.P.	V	15.33	-25.32	34.31	46.00	11.69
Above 550	Not Detected							

b. 98.9 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
98.9	59.90	Q.P.	V	9.10	-26.38	42.62	48.00	5.38
46.98	33.70	Q.P.	V	9.83	-26.98	16.55	40.00	23.45
301.45	27.90	Q.P.	V	10.92	-24.75	14.07	46.00	29.43
500.45	23.90	Q.P.	V	15.33	-25.32	13.91	46.00	29.59
Above 550	Not Detected							

c. 107.9 MHz

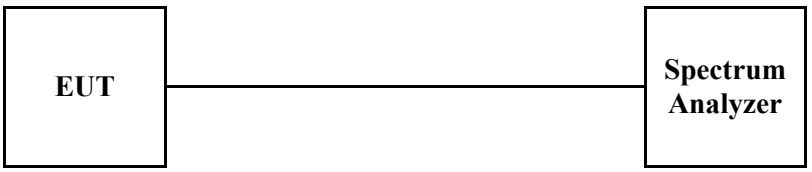
Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)
107.9	63.90	Q.P.	V	9.46	-26.28	47.08	48.00	0.92
49.40	51.80	Q.P.	V	8.29	-26.96	33.13	40.00	6.87
301.60	36.20	Q.P.	V	10.93	-24.75	22.38	46.00	21.12
500.45	41.90	Q.P.	V	15.33	-25.32	31.91	46.00	14.09
Above 550	Not Detected							

Remark:

1. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

4. 20 dB bandwidth and band edge

4.1. Test setup



4.2. Limit

According to §15.239(a), emissions from the intentional radiator shall be confined within a band 200kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88-108MHz.

4.3. Test procedure

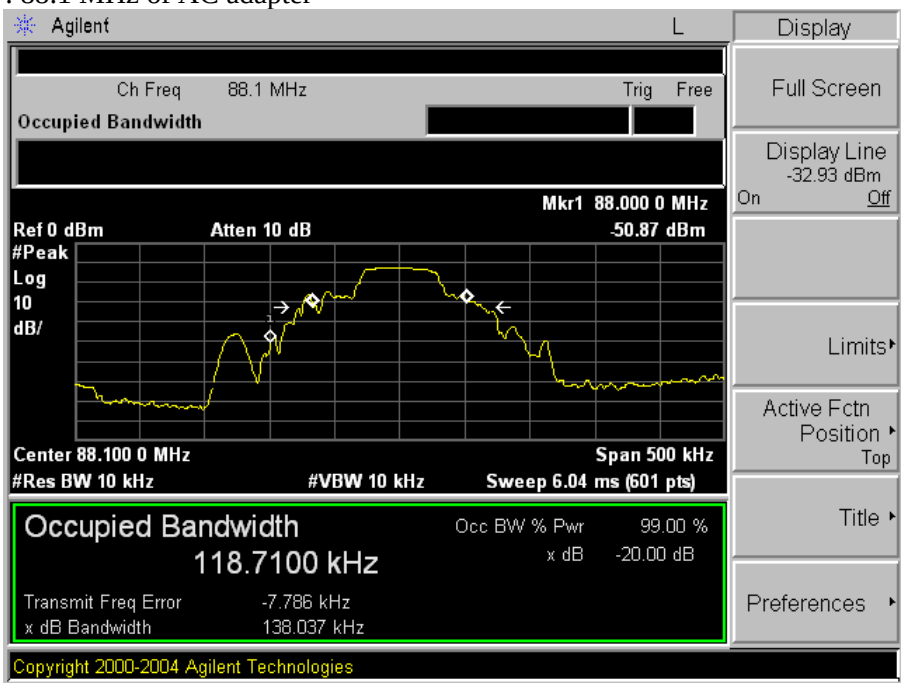
1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 10 kHz, VBW = RBW, Span =500 kHz, Sweep = auto.
4. Mark the peak frequency and 20 dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

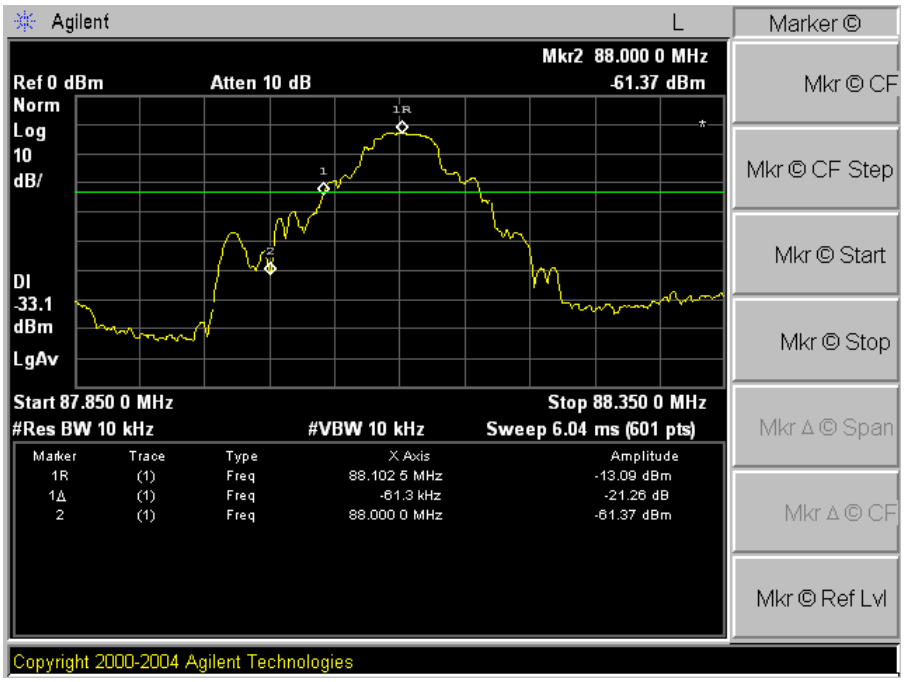
4.4. Test result

Ambient temperature : 22 ℃ Relative humidity : 46 %

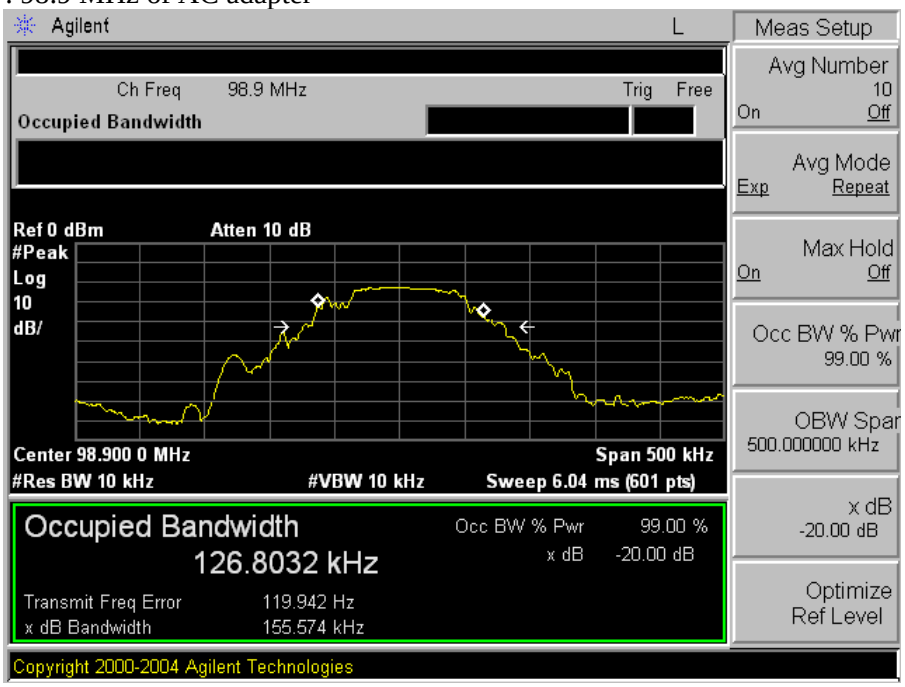
Type of power supply	Frequency (MHz)	20 dB Bandwidth (kHz)
AC adapter	88.1	138.04
	98.9	155.57
	107.9	130.41
Cigar jack	88.1	138.04
	98.9	155.57
	107.9	130.41
Battery	88.1	138.04
	98.9	155.57
	107.9	130.41

Frequency : 88.1 MHz of AC adapter

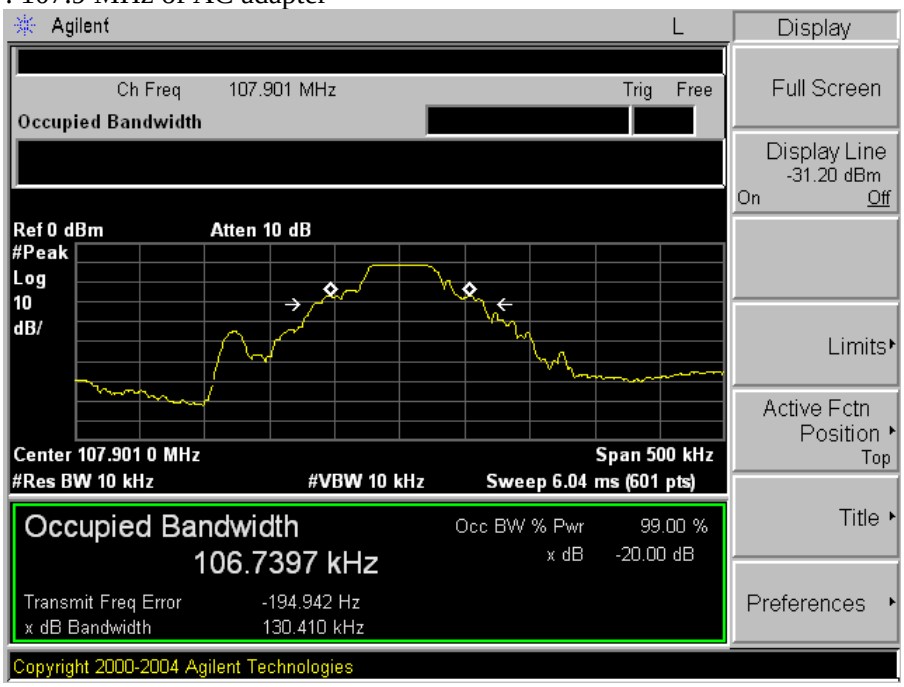


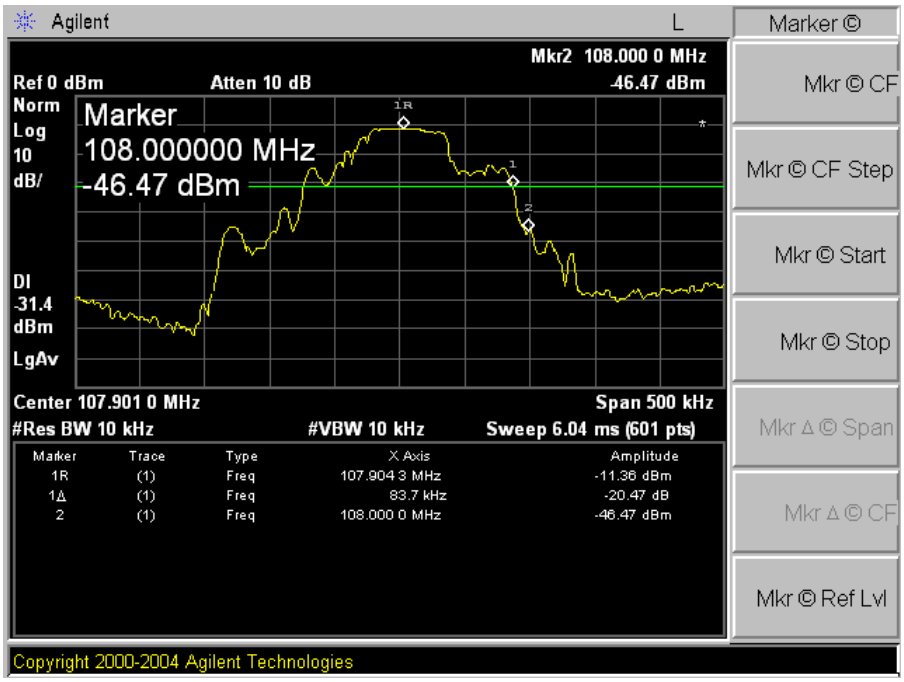


Frequency : 98.9 MHz of AC adapter

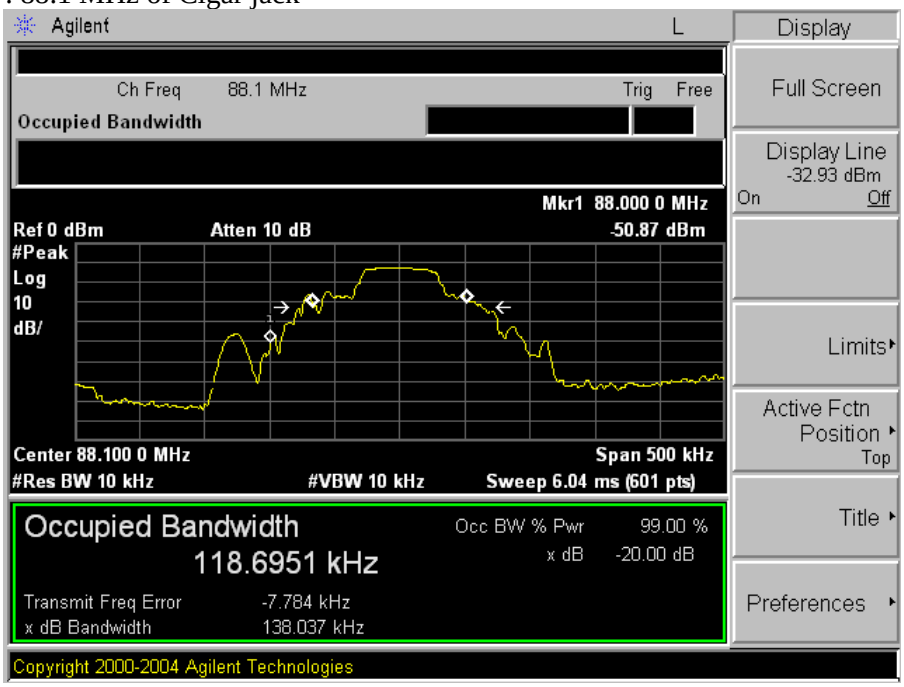


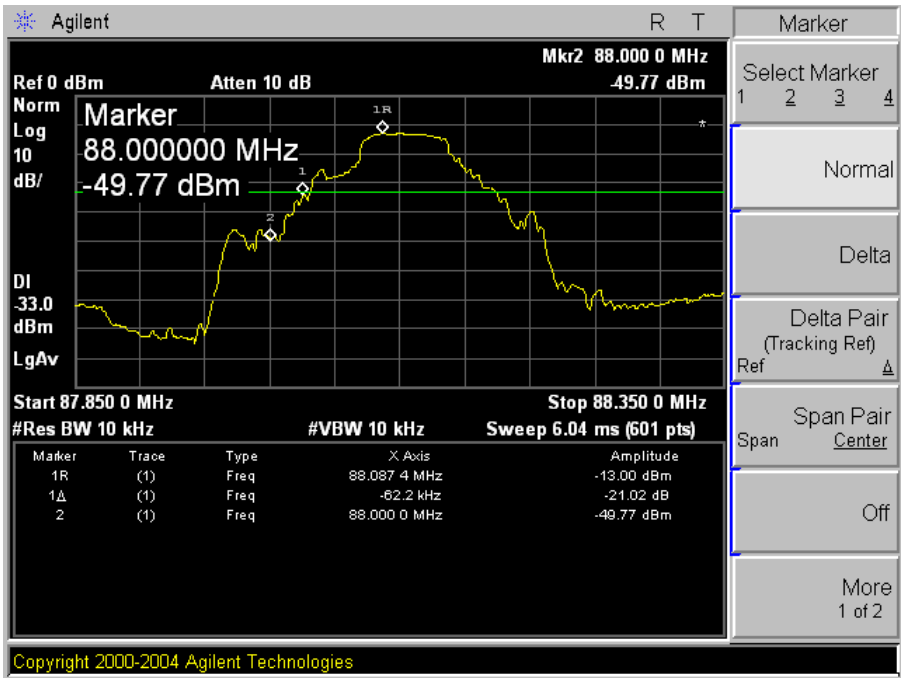
Frequency : 107.9 MHz of AC adapter



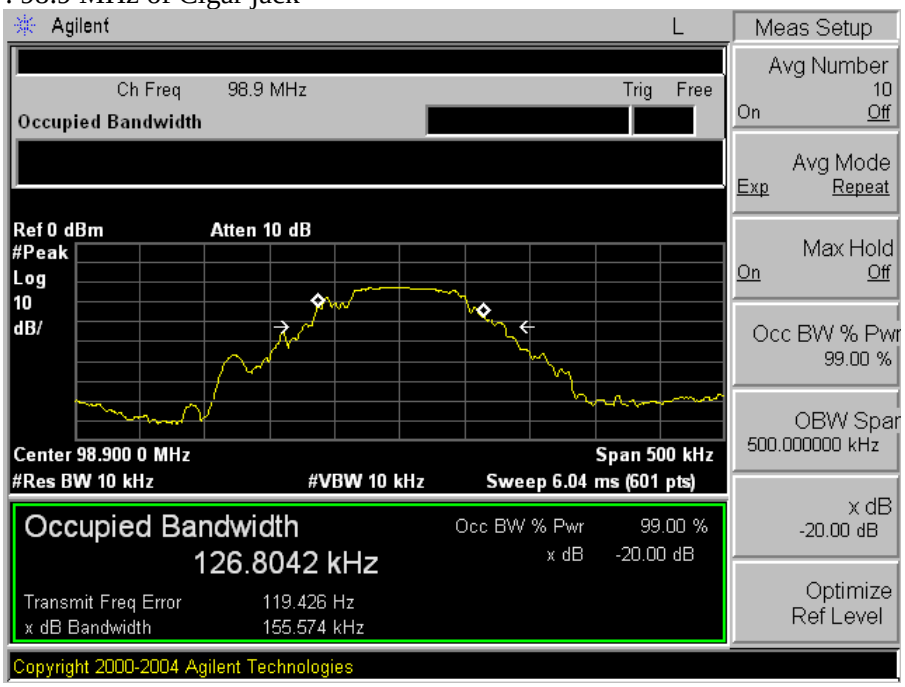


Frequency : 88.1 MHz of Cigar jack

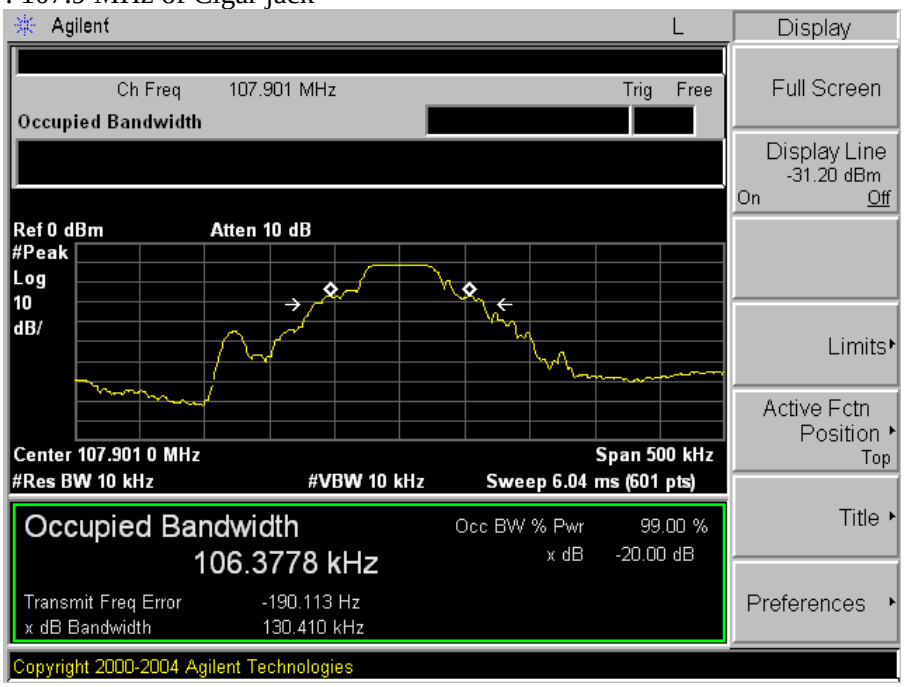


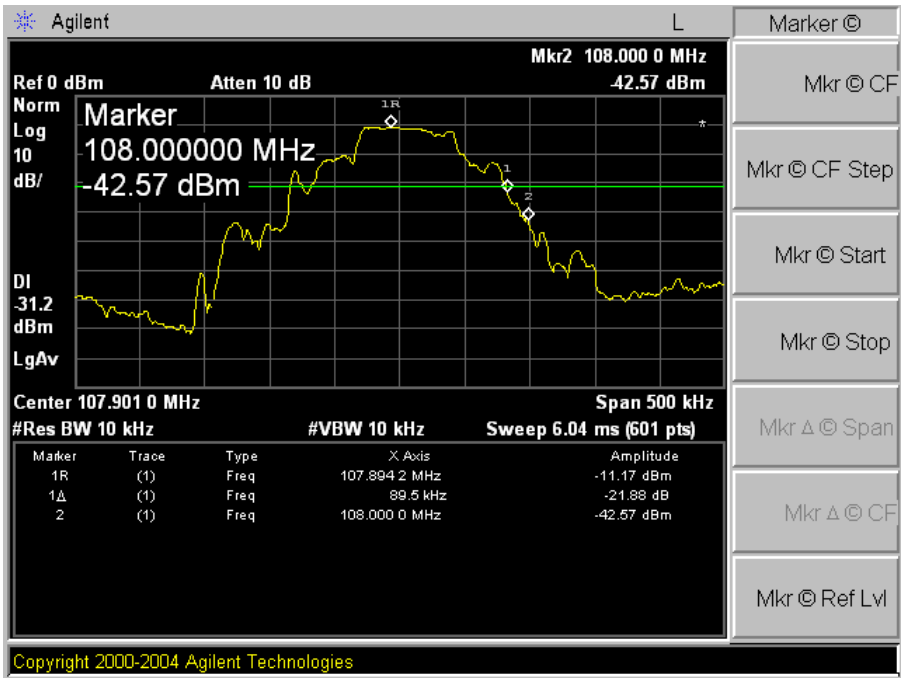


Frequency : 98.9 MHz of Cigar jack

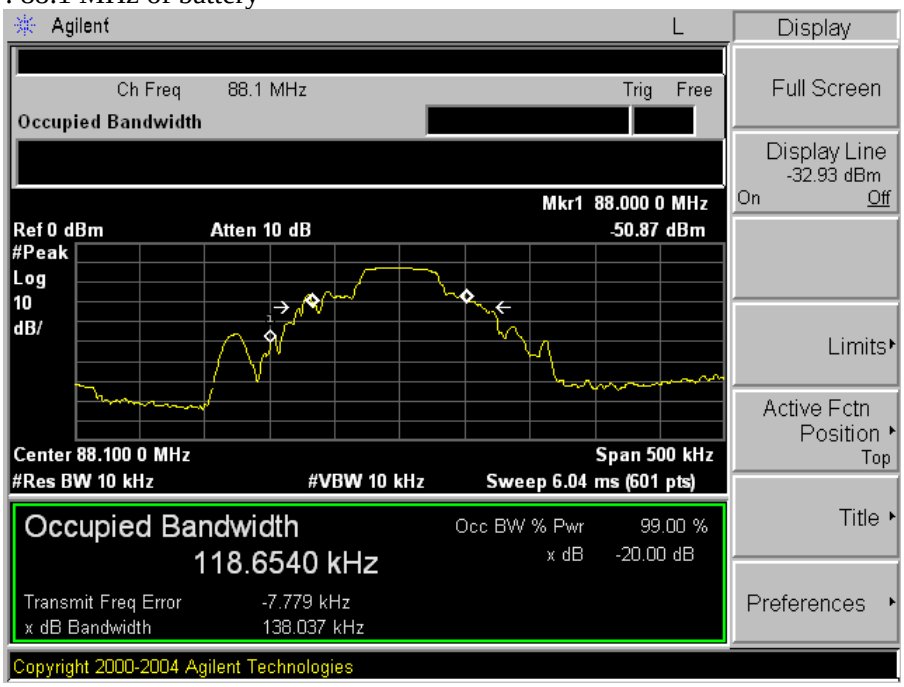


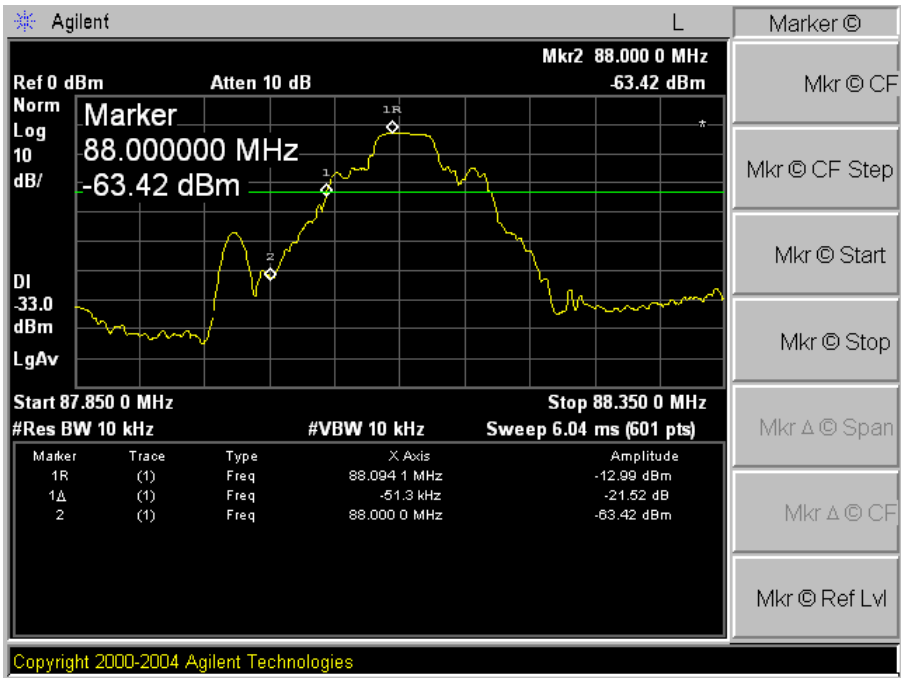
Frequency : 107.9 MHz of Cigar jack



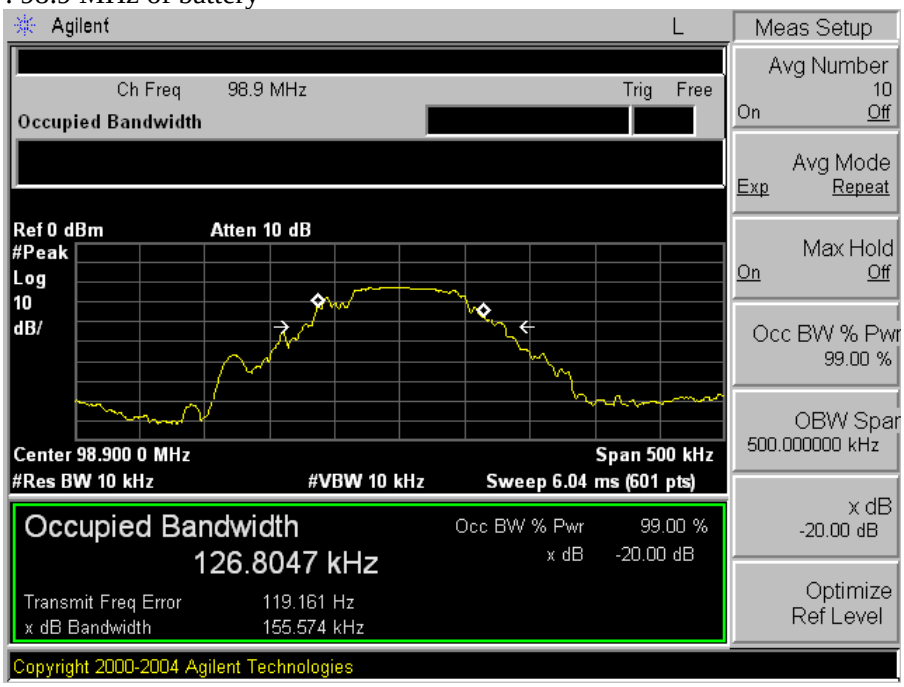


Frequency : 88.1 MHz of battery

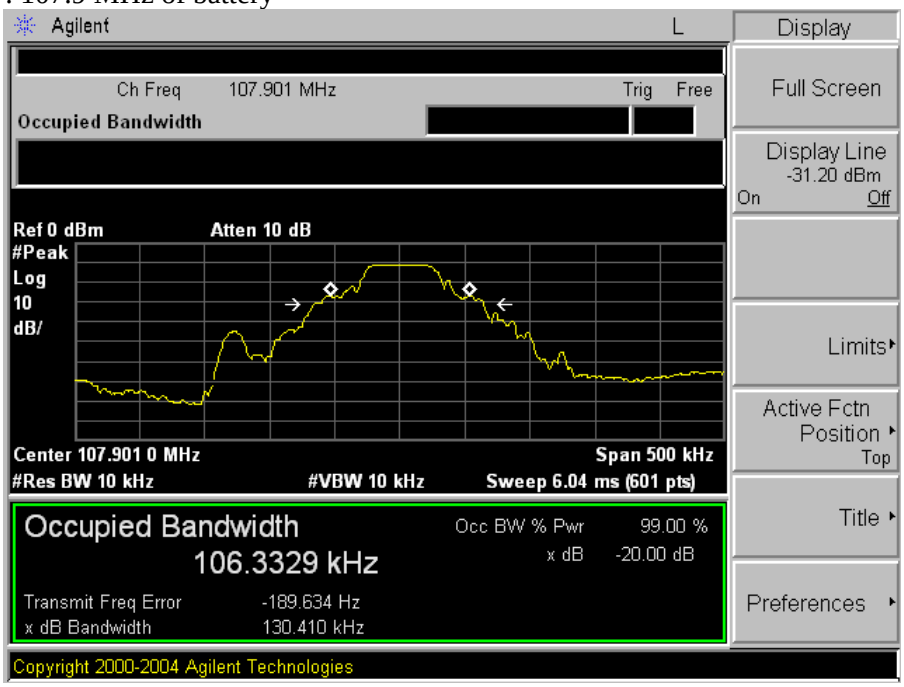


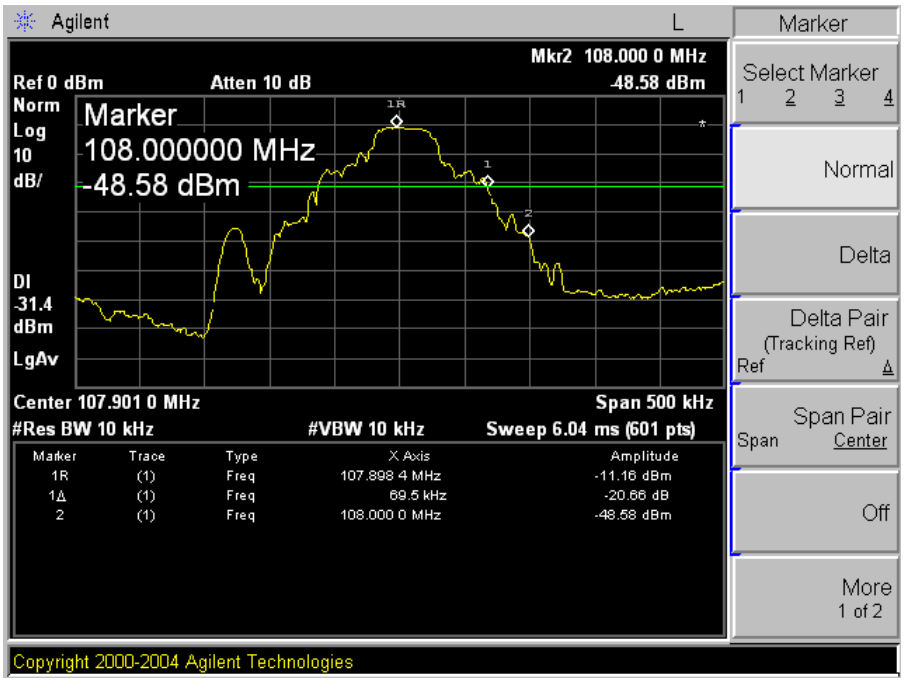


Frequency : 98.9 MHz of battery

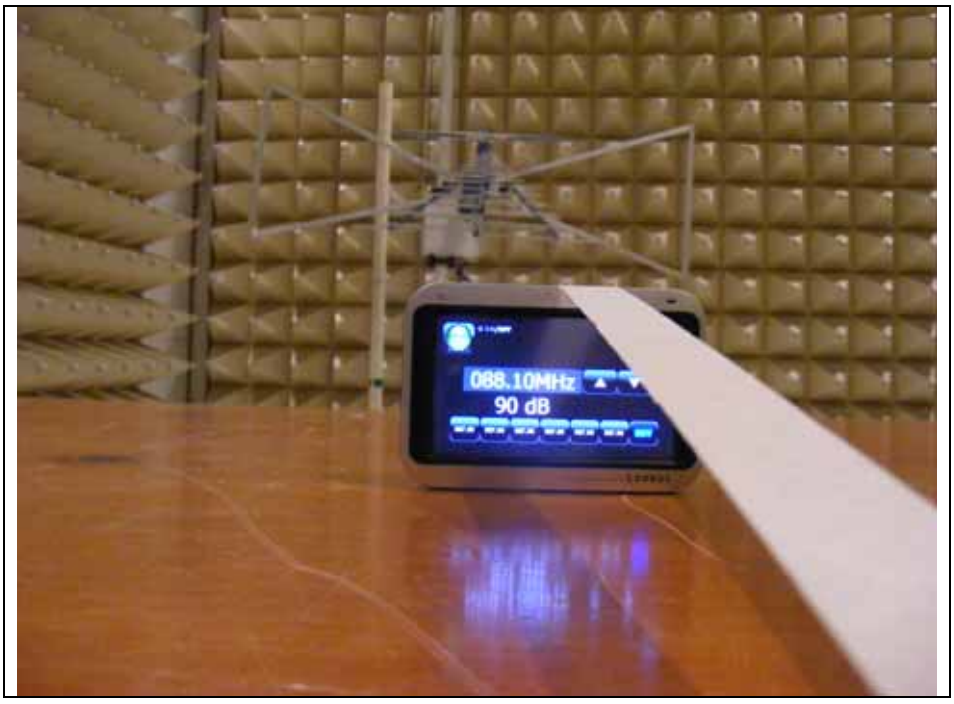


Frequency : 107.9 MHz of battery

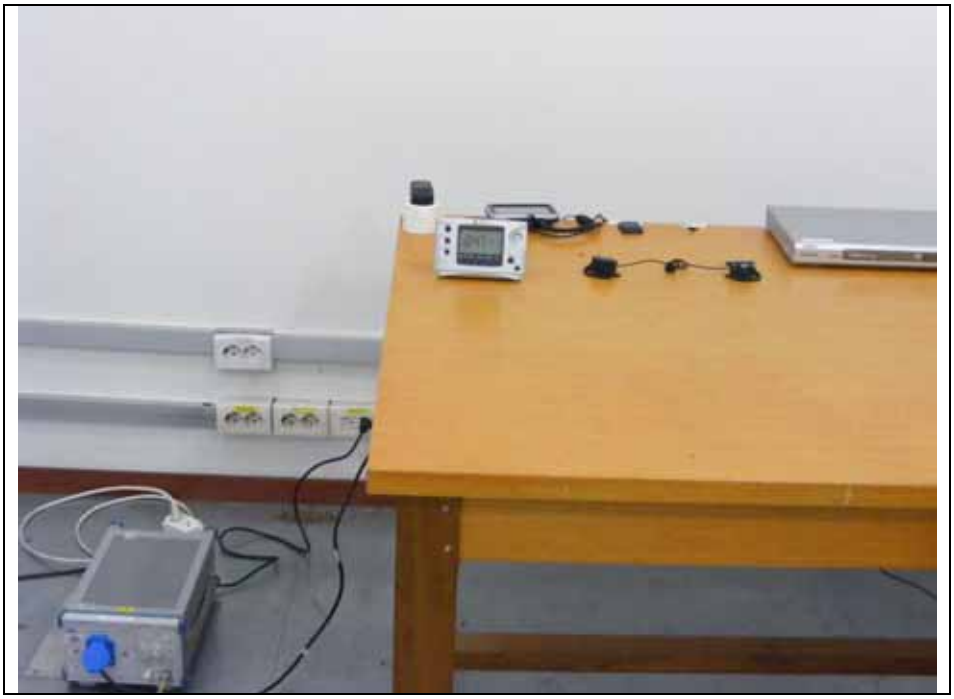




Appendix A-1. Photo of field strength & spurious emission test



Appendix A -2. Photos of conducted power line test



Appendix B. Photos of the EUT

Front View of EUT

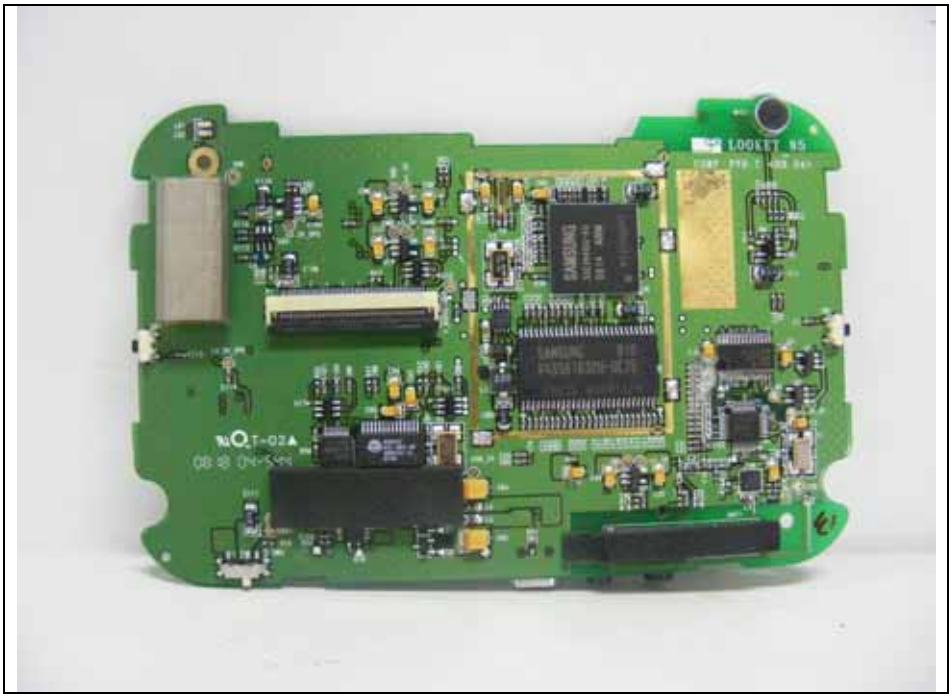
Rear View of EUT

Right View of EUT

Left View of EUT

Inner of EUT

Top View of Main-board

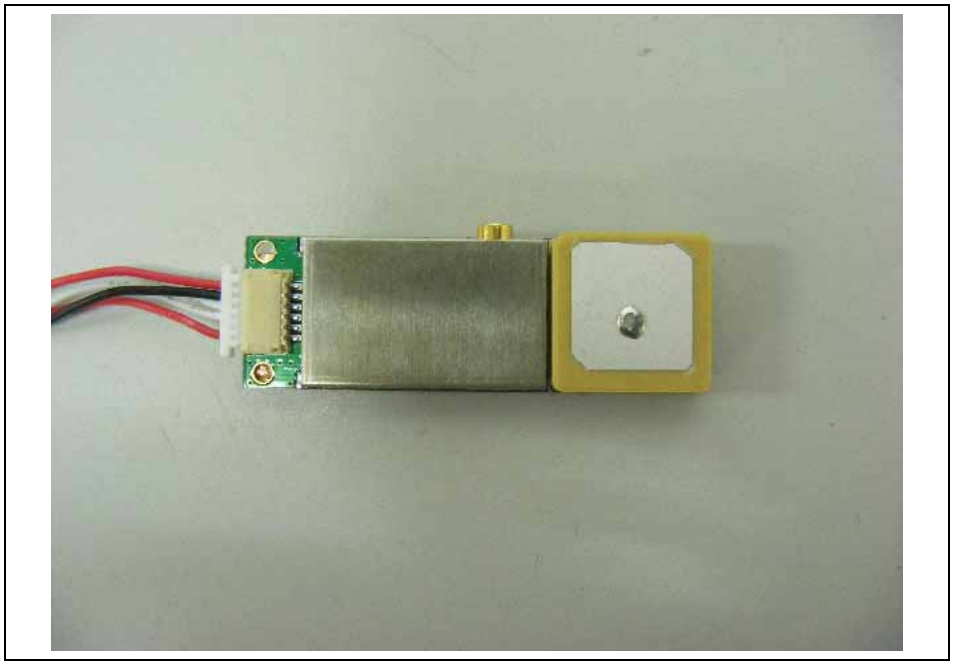


Bottom View of Main-board

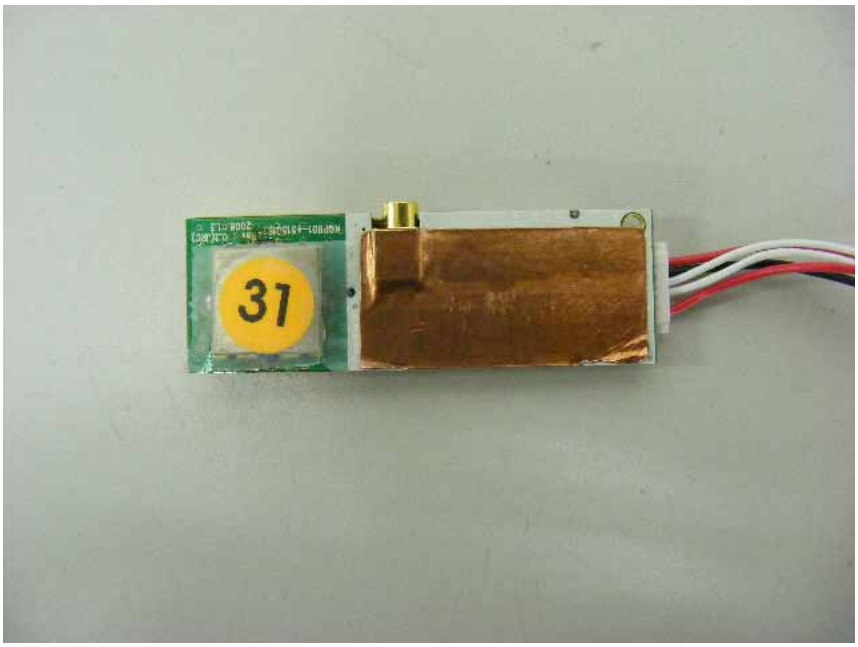
Top View of LCD

Bottom View of Main-board

Top View of GPS(Internal)

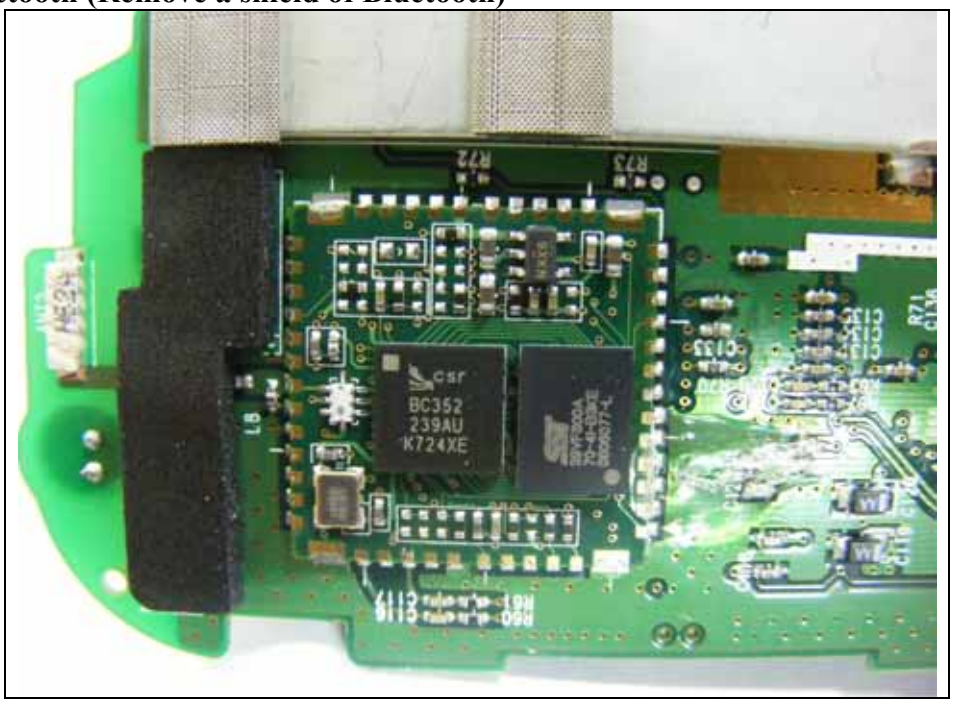


Bottom View of GPS(Internal)

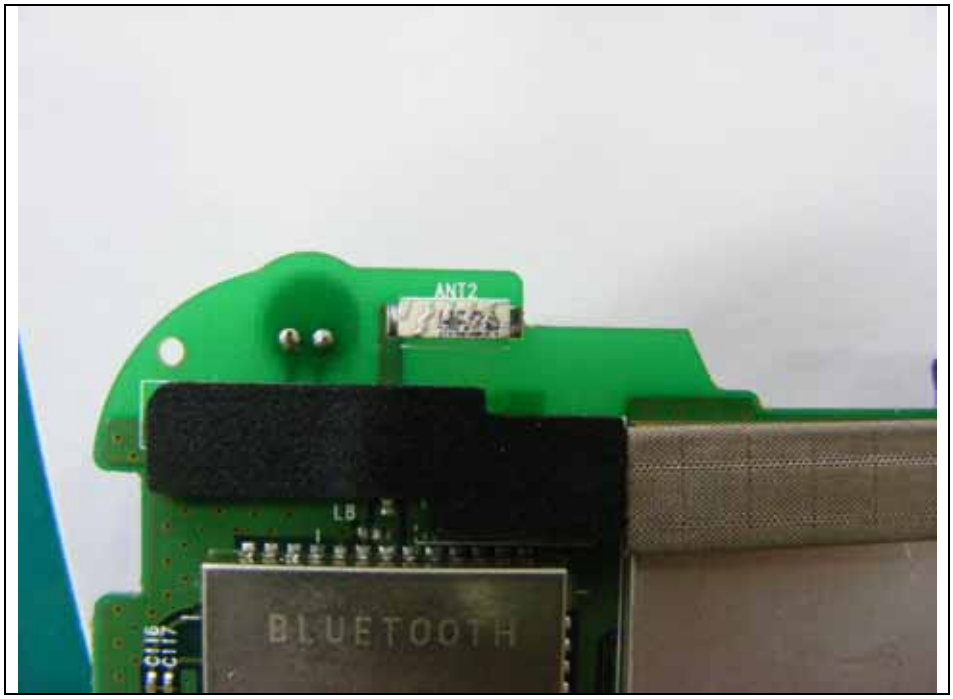


Top View of GPS (External)

View of Bluetooth (Remove a shield of Bluetooth)



View of Bluetooth ANT



View of FM Transmitter ANT