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MEASUREMENT REPORT FCC Part 15B

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu
Suwon-city, Gyeonggi-do, 443-803
Republic of Korea

Date of Testing:
4/15/2013
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1304100622.A3L


FCC ID:	A3LGTB9150
APPLICANT:	Samsung Electronics Co., Ltd.

Application Type: Class II Permissive Change
EUT Type: Wireless LAN Multimedia Box
Model(s): GT-B9150
FCC Rule Part(s): FCC Part 15 Subpart B
FCC Classification: FCC Class B Digital Device (JBP)
Test Procedure: ANSI C63.4-2009
Class II Perm. Change: *Please see FCC change documents.*
Original Grant Date: 4/15/2013

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in ANSI C63.4-2009 (See Test Report). The results shown herein are also deemed satisfactory evidence of compliance with Industry Canada Interference-Causing Equipment Standard ICES-003. These measurements were performed with no deviation from the standards. Test results reported herein relate only to the item(s) tested.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

NVLAP accreditation does not constitute any product endorsement by NVLAP or any agency of the United States Government. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.


 Randy Ortanez
 President







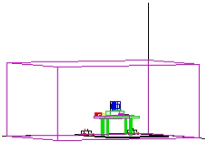
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MEASUREMENT REPORT

FCC Part 15B – Unintentional Radiators



§ 2.1033 General Information

APPLICANT: Samsung Electronics Co., Ltd.

APPLICANT ADDRESS: 129, Samsung-ro, Yeongtong-gu
Suwon-city, Gyeonggi-do, 443-803

TEST SITE: PCTEST ENGINEERING LABORATORY, INC.

TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21046 USA

FCC RULE PART(S): FCC Part 15 Subpart B

FCC ID: A3LGTB9150

Test Device Serial No.: R32D30004SV Production Pre-Production Engineering

FCC CLASSIFICATION: FCC Class B Digital Device (JBP)

DATE(S) OF TEST: 4/15/2013



Test Methodology

Both conducted and radiated measurements were taken using the methods and procedures described in ANSI C63.4-2009. Radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility / NVLAP Accreditation

Conducted and radiated tests were performed at PCTEST Engineering Lab in Columbia, MD 21046, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) in EMC, Telecommunication, and FCC for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. (NVLAP Lab code: 100431-0).
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern't'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on February 15, 2012.

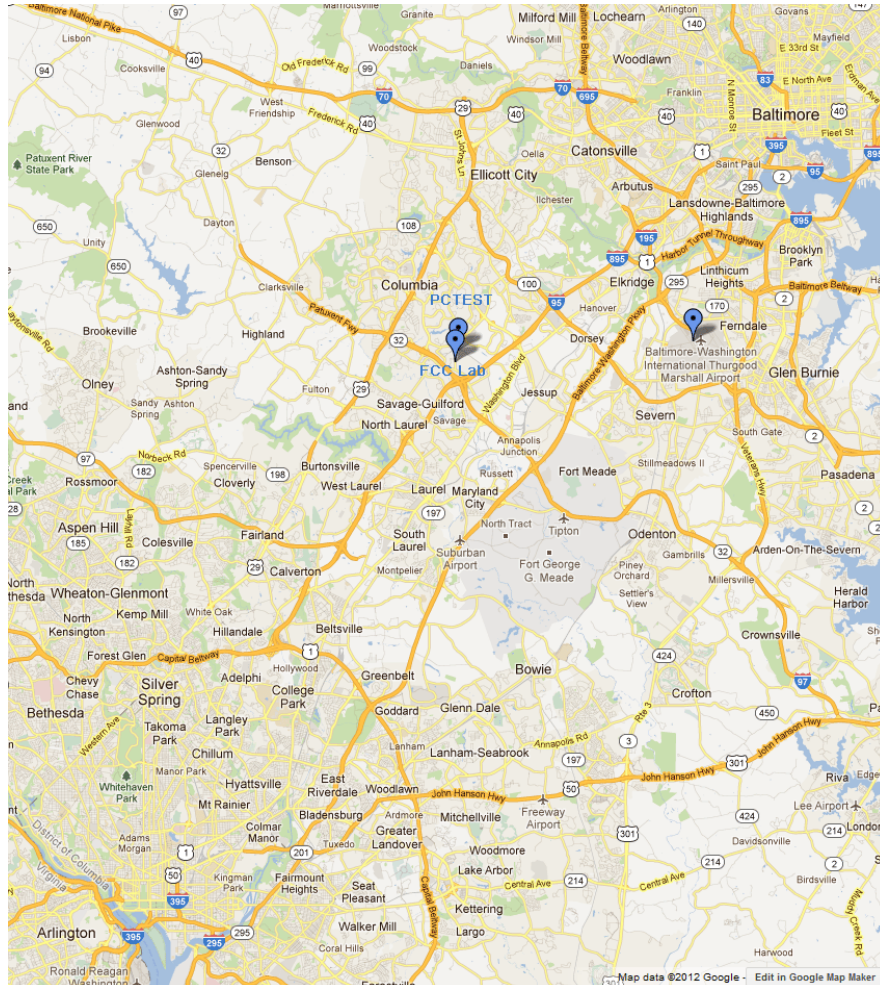




Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Wireless LAN Multimedia Box FCC ID: A3LGTB9150**. The test data contained in this report pertains only to the emissions due to the digital circuitry of the EUT.

2.2 Device Capabilities

This device contains the following capabilities:

802.11a/b/g/n WLAN (DTS/NII), WiFi 2x2 MIMO, Bluetooth (1x,EDR, LE)

2.3 Test Configuration

The Samsung Wireless LAN Multimedia Box FCC ID: A3LGTB9150 was tested with a laptop PC connected via USB interface port. The EUT was exercised during testing by means of software installed on the PC. Since the EUT is a peripheral device, the host PC was populated with another USB device and an additional peripheral device with a non-USB interface, as shown in Table 7-2, thus satisfying the minimum system requirement of two different I/O interfaces. All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2009 and manipulated to obtain worst case emissions.

For more information please see Section 7.0 for test data and Sections 9.0 and 10.0 for the test setup photographs.

2.4 EMI Suppression Device(s)/Modifications



No EMI suppression device(s) were added and no modifications were made during testing.

2.5 Labeling Requirements

Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5).

Please see attachment for FCC ID label and label location.

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3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2009) was used in the measurement of the **Samsung Wireless LAN Multimedia Box FCC ID: A3LGTB9150**.

Note:



No deviations from the specified test procedure.

3.2 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A ¾" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by varying: the mode of operation or resolution, clock or data rate, scrolling H pattern to the EUT and/or support equipment, and changing the polarity of the receive antenna, whichever produced the worst-case emissions. To record the final measurements, the analyzer detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 120kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. For average measurements above 1GHz, the analyzer was set to peak detector with a reduced VBW setting (RBW = 1MHz, VBW = 10Hz).

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4.0 SAMPLE CALCULATIONS

4.1 Conducted Emission Measurement Sample Calculation

@ 20.3 MHz

Class B limit	=	60.0 dB μ V (Quasi-peak limit)
Reading	=	- 57.8 dBm (calibrated quasi-peak level)
Convert to dB μ V	=	- 57.8 + 107 = 49.2 dB μ V
Margin	=	49.2 - 60.0 = - 10.8 dB
	=	10.8 dB below limit

4.2 Radiated Emission Measurement Sample Calculation



@ 66.7 MHz

Class B limit	=	100 μ V/m = 40.0 dB μ V/m
Reading	=	- 76.0 dBm (calibrated level)
Convert to dB μ V	=	- 76.0 + 107 = 31.0 dB μ V
Antenna Factor + Cable Loss	=	5.8 dB/m
Total	=	36.8 dB μ V/m
Margin	=	36.8 - 40.0 = - 3.2 dB
	=	3.2 dB below limit

Note:

$$\text{Level [dB}\mu\text{V]} = 20 \log_{10} (\text{Level } [\mu\text{V/m}])$$

$$\text{Level [dB}\mu\text{V]} = \text{Level [dBm]} + 107$$



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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	3/29/2013	Annual	3/29/2014	N/A
Agilent	8447D	Broadband Amplifier	5/8/2012	Annual	5/8/2013	2443A01900
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	5/10/2012	Annual	5/10/2013	121034
Rohde & Schwarz	ESU26	EMI Test Receiver	2/25/2013	Annual	2/25/2014	100342
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

Table 5-1. Annual Test Equipment Calibration Schedule



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6.0 ENVIRONMENTAL CONDITIONS

The temperature is controlled within range of 15°C to 35°C.

The relative humidity is controlled within range of 10% to 75%.

The atmospheric pressure is controlled within the range 86-106kPa (860-1060mbar).

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7.0 TEST DATA

7.1 Summary

Test Date(s): 4/15/2013

Test Engineer: *P. Rigalora*

FCC Part 15 Section	Description	Result
15.109	Radiated Emissions	PASS

Table 7-1. Summary of Test Results

7.2 Test Support Equipment

1	Samsung USB Cable	Model: N/A 1.0m Shielded USB Cable	S/N: N/A
2	Dell Notebook PC #1 w/ Dell AC Adapter	Model: Vostro 3555 (DoC) Model: PA-1600-06D2 0.85m Unshielded AC power cord 1.80m Unshielded DC power cord with ferrite bead on notebook end	A/N: PCT80759 S/N: CN-0928G4-71615-1CE-3447-A01
3	Dell Mouse	Model: X06-08477 (DoC) 1.8m Shielded Data cable	S/N: 63618-OEM
4	Gateway Keyboard	Model: SK-9921 (DoC) 1.8m Shielded Data cable	S/N: CO84851
5	Samsung 19" LCD Monitor	Model: UN19F4000AF (DoC) 1.52m Unshielded AC power cord 1.48m Unshielded DC power cord with ferrite bead on notebook end	S/N: Z6U03CLD203498R

Table 7-2. Test Support Equipment Used

Note: See test setup photographs for actual system test setup.

7.3 Radiated Measurement Data



§15.109; RSS-Gen (6(a))

Frequency [MHz]	Level [dBm]	AFCL [dB/m]	Pol [H/V]	Height [m]	Azimuth [degrees]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
47.09	-83.02	10.72	V	1.4	264	34.70	40.00	-5.30
224.31	-86.38	13.95	H	1.1	119	34.57	46.02	-11.45
297.31	-84.31	15.80	V	1.4	264	38.49	46.02	-7.53
594.18	-91.86	21.88	H	1.1	119	37.02	46.02	-9.00
713.97	-89.08	23.73	V	1.4	264	41.65	46.02	-4.37
743.51	-89.94	24.15	H	1.1	119	41.21	46.02	-4.81

Table 7-3. Radiated Measurements at 3-meters



NOTES:

- All modes of operation were investigated and the worst-case emissions are reported.
- Radiated emissions were measured from 30MHz – 6000MHz to ensure that the provisions of 15.33(b)(1) are satisfied with respect to the upper frequency scanning range.
- The radiated limits for unintentional radiators at a distance of 3 meters are used in the table above, as specified in 15.109(a).
- All readings are calibrated by a signal generator with accuracy traceable to the National Institute of Standards and Technology (NIST).
- AFCL (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
- Level (dB μ V/m) = Analyzer Reading (dBm) + AFCL (dB/m) + 107
- Margin (dB) = Field strength (dB μ V/m) – Limit (dB μ V/m)
- Measurements are made using a CISPR quasi-peak detector with a 100kHz resolution bandwidth. Above 1GHz, peak measurements are made using a peak detector with a resolution bandwidth of 1MHz and a video bandwidth of 3MHz and average measurements are made with a peak detector using a resolution bandwidth of 1MHz and a video bandwidth of 10Hz.
- Calibrated linearly polarized broadband and horn antennas were used for measurements below and above 1GHz, respectively. For measurements made below 1GHz, the results recorded using the broadband antenna are known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy.
- Calibrated low-loss microwaves cables and broadband amplifiers are used.

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Wireless LAN Multimedia Box FCC ID: A3LGTB9150** has been tested to comply with the requirements specified in §15.107 and §15.109 of the FCC Rules and Industry Canada Standard ICES-003.

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