



# PCTEST ENGINEERING LABORATORY, INC.

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## CERTIFICATE OF COMPLIANCE FCC Part 15B Certification

**Applicant Name:**  
Samsung Electronics, Co. Ltd.  
18600 Broadwick St.  
Rancho Dominguez, CA 90220  
United States

**Date of Testing:**  
June 24, 2009  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0906221262.A3L

<b>FCC ID:</b>	<b>A3LGTS5233W</b>
<b>APPLICANT:</b>	<b>Samsung Electronics, Co. Ltd.</b>

**EUT Type:** 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN  
**Model(s):** GT-S5233W  
**FCC Rule Part(s):** FCC Part 15 Subpart B  
**FCC Classification:** FCC Class B Digital Device (JBP)  
**Test Procedure:** ANSI C63.4-2003

The device bearing the FCC Identifier specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 (See Test Report). 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. PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.*



Randy Ortanez  
President



<b>FCC ID:</b> A3LGTS5233W		<b>FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0906221262.A3L	<b>Test Dates:</b> June 24, 2009	<b>EUT Type:</b> 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 1 of 20	

## TABLE OF CONTENTS

FCC Class B MEASUREMENT REPORT.....	3
1.0 INTRODUCTION.....	4
1.1 SCOPE.....	4
1.2 PCTEST TEST LOCATION.....	4
2.0 PRODUCT INFORMATION.....	5
2.1 EQUIPMENT DESCRIPTION.....	5
2.2 OPERATION MODE.....	5
2.3 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS.....	5
2.4 LABELING REQUIREMENTS.....	5
3.0 DESCRIPTION OF TEST.....	6
3.1 EVALUATION PROCEDURE.....	6
3.2 CONDUCTED EMISSIONS.....	6
3.3 RADIATED EMISSIONS.....	7
4.0 SAMPLE CALCULATIONS.....	8
4.1 CONDUCTED EMISSION MEASUREMENT SAMPLE CALCULATION.....	8
4.2 RADIATED EMISSION MEASUREMENT SAMPLE CALCULATION.....	8
5.0 TEST EQUIPMENT CALIBRATION DATA.....	9
6.0 ENVIRONMENTAL CONDITIONS.....	10
7.0 TEST DATA.....	11
7.1 SUMMARY.....	11
7.2 TEST SUPPORT EQUIPMENT.....	11
7.3 RADIATED MEASUREMENT DATA.....	12
7.4 LINE CONDUCTED MEASUREMENT DATA.....	13
8.0 CONCLUSION.....	15
9.0 TEST SETUP PHOTOGRAPHS.....	16
10.0 EUT PHOTOGRAPHS.....	19

<b>FCC ID:</b> A3LGTS5233W		<b>FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0906221262.A3L	<b>Test Dates:</b> June 24, 2009	<b>EUT Type:</b> 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 2 of 20	



## MEASUREMENT REPORT

### FCC Part 15B – Unintentional Radiators



#### § 2.1033 General Information

**APPLICANT:** Samsung Electronics, Co. Ltd.  
**APPLICANT ADDRESS:** 18600 Broadwick St.  
 Rancho Dominguez, CA 90220  
**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.  
**TEST SITE ADDRESS:** 6660-B Dobbin Road, Columbia, MD 21045 USA  
**FCC RULE PART(S):** FCC Part 15 Subpart B  
**FCC ID:** A3LGTS5233W  
**Test Device Serial No.:** FG-174-B     Production     Pre-Production     Engineering  
**FCC CLASSIFICATION:** FCC Class B Digital Device (JBP)  
**DATE(S) OF TEST:** June 24, 2009



#### Test Methodology

Both conducted and radiated measurements were taken using the methods and procedures described in ANSI C63.4-2003. 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 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) 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 (IC 2451).
- 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 (IC-2451) test laboratory with the site description on file at Industry Canada.

<b>FCC ID:</b> A3LGTS5233W		<b>FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0906221262.A3L	<b>Test Dates:</b> June 24, 2009	<b>EUT Type:</b> 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 3 of 20	

# 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.

## 1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity area, the Baltimore-Washington Intern'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 in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 27, 2006.

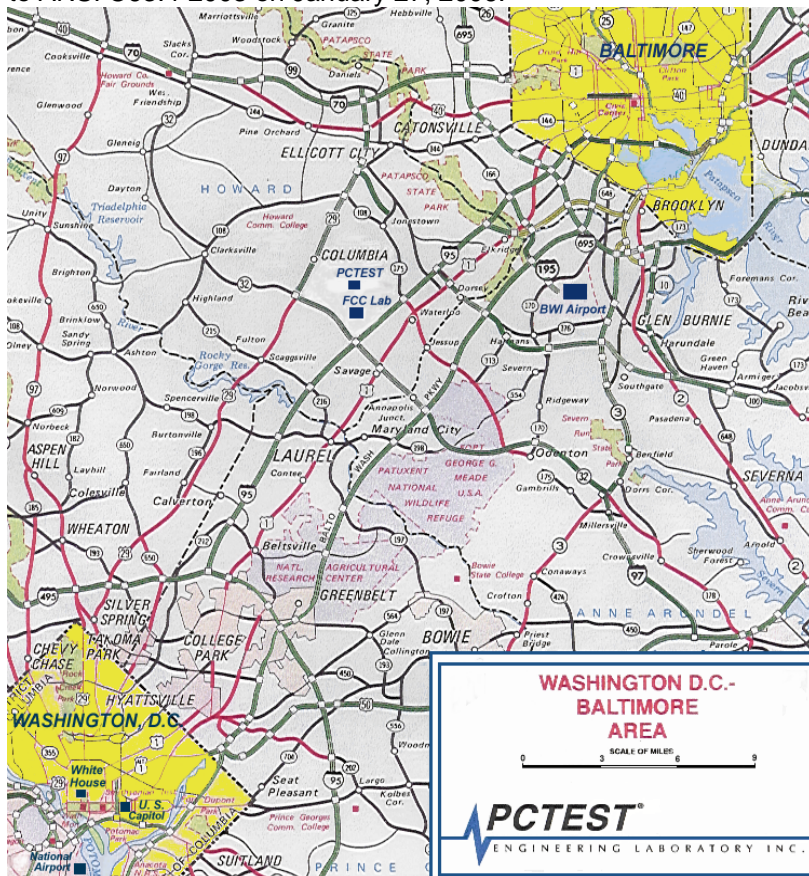


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN		Page 4 of 20

## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN FCC ID: A3LGTS5233W**. The test data contained in this report pertains only to the emissions due to the digital circuitry of the EUT.

Manufacturer / Base Model	FCC ID	Description
Samsung / Model: GT-S5233W	A3LGTS5233W	850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN

**Table 2-1. EUT Equipment Description**

### 2.2 Operation Mode

The Samsung 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN FCC ID: A3LGTS5233W was tested with a NOTEBOOK connected via USB interface port. For more information please see Section 7.0 for test data and Sections 9.0 and 10.0 for the test setup photographs.

### 2.3 EMI Suppression Device(s)/Modifications



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

### 2.4 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(b)(2).

Please see attachment for FCC ID label and label location.

FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 5 of 20	

## 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 C63.4-2003) was used in the measurement of the **Samsung 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN FCC ID: A3LGTS5233W**.

Deviation from measurement procedure.....None

### 3.2 Conducted Emissions



**Figure 3-1. Shielded Enclosure Line-Conducted Test Facility**



**Figure 3-2. Line Conducted Emission Test Set-Up**



**Figure 3-3. Wooden Table & Bonded LISNs**



**Figure 3-4. LISN Schematic Diagram**

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (see Figure 3-1). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (see Figure 3-2). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 3-3). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (see Figure 3-4). All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion). 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 RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.

The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in the test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator.

<b>FCC ID:</b> A3LGTS5233W		<b>FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)</b>	
<b>Test Report S/N:</b> 0906221262.A3L	<b>Test Dates:</b> June 24, 2009	<b>EUT Type:</b> 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	<b>Reviewed by:</b> Quality Manager
			Page 6 of 20

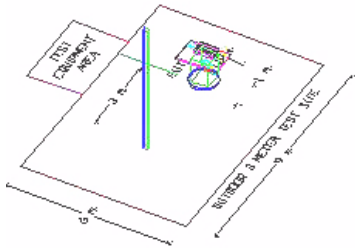
### 3.3 Radiated Emissions



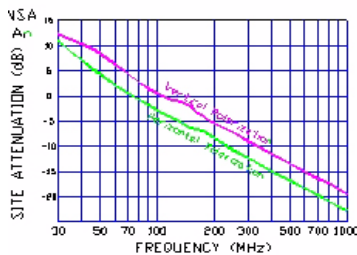
**Figure 3-5. 3-Meter Test Site**



**Figure 3-6. Dimensions of Outdoor Test Site**



**Figure 3-7. Turntable and System Setup**



**Figure 3-8. Normalized Site Attenuation Curves (H&V)**

Preliminary measurements were made indoors at 1-meter using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, and turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using a bi-conical antenna and from 200 to 1000 MHz using a log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antennas (see Figure 3-5). The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m area adjacent to the measurement area (see Figure 3-6). 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 detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. Above 1GHz the detector function was set to average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 3-7). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated 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 exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in the test setup photographs. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3-8.

FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN		Page 7 of 20

## 4.0 SAMPLE CALCULATIONS

### 4.1 Conducted Emission Measurement Sample Calculation

@ 20.3 MHz

Class B limit	=	60.0 dB $\mu$ V (Quasi-peak limit)
Reading	=	- 57.8 dBm (calibrated quasi-peak level)
Convert to dB $\mu$ V	=	- 57.8 + 107 = 49.2 dB $\mu$ V
Margin	=	49.2 - 60.0 = - 10.8 dB
	=	<b>10.8 dB below limit</b>

### 4.2 Radiated Emission Measurement Sample Calculation



@ 66.7 MHz

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

**Note:**

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

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



FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 8 of 20	

## 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
-	No.165	(30MHz - 1000MHz) RG58 Coax Cable	N/A		N/A	N/A
-	No.166	(1000-26500MHz) Microwave RF Cable	N/A		N/A	N/A
-	No.167	(100kHz - 100MHz) RG58 Coax Cable	N/A		N/A	N/A
Agilent	11713A	Attenuation/Switch Driver	12/4/2008	Annual	12/4/2009	3439A02645
Agilent	8447D	Broadband Amplifier	N/A		N/A	1937A03348
Agilent	8447D	Broadband Amplifier	N/A		N/A	2443A01900
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	12/4/2008	Annual	12/4/2009	3008A00985
Agilent	85650A	Quasi-Peak Adapter	12/4/2008	Annual	12/4/2009	3303A01872
Agilent	85650A	Quasi-Peak Adapter	3/24/2009	Annual	3/24/2010	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	3/24/2009	Annual	3/24/2010	2618A02866
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	3/24/2009	Annual	3/24/2010	2542A11898
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	12/5/2008	Annual	12/5/2009	3638A08713
Agilent	8591A	(9kHz-1.8GHz) Spectrum Analyzer	8/19/2008	Annual	8/19/2009	3144A02458
Agilent	E4407B	ESA Spectrum Analyzer	3/24/2009	Annual	3/24/2010	US39210313
Agilent	E4448A	PSA (3Hz-50GHz) Spectrum Analyzer	12/5/2008	Annual	12/5/2009	US42510244
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/25/2009	Biennial	3/25/2011	MY45470194
Compliance Design	Roberts	Dipole Set	11/9/2007	Biennial	11/9/2009	146
Compliance Design	Roberts	Dipole Set	11/9/2007	Biennial	11/9/2009	147
Emco	6502	Active Loop Antenna (10k - 30 MHz)	5/15/2009	Biennial	5/15/2011	267
Pasternack	PE7000-6	6 dB Attenuator	N/A		N/A	N/A
Solar Electronics	8012-50-R-24-BNC	LISN	11/8/2007	Biennial	11/8/2009	310233
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	6/25/2007	Biennial	6/25/2009	A051107

**Table 5-1. Annual Test Equipment Calibration Schedule**



FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 9 of 20	

## 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).

<b>FCC ID:</b> A3LGTS5233W		<b>FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0906221262.A3L	<b>Test Dates:</b> June 24, 2009	<b>EUT Type:</b> 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 10 of 20	

## 7.0 TEST DATA

### 7.1 Summary

Test Date(s): June 24, 2009

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Test Engineer: Ivan Toporkov

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FCC Part 15 Section	Description	Result
15.107	Conducted Emissions	PASS
15.109	Radiated Emissions	PASS

**Table 7-1. Summary of Test Results**

### 7.2 Test Support Equipment

1	Samsung USB Datalink Cable 1.1m Shielded USB Cable	Model: APCBS10BBE	S/N: RT1S224KS B
2	Panasonic Toughbook #2 w/ Panasonic AC Adapter	FCC ID: ACJ9TGCF-513 Model: CF-AA1683A 2.0m Unshielded AC power cord 2.0m Unshielded DC power cord with ferrite bead on notebook end	S/N: 7ATYA28277R S/N: 1683AM306Y01583D
3	Dynex USB PC Camera	Model: DX-WC101 (DoC) 2.07m Shielded USB Cable	S/N: 122D05AC

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

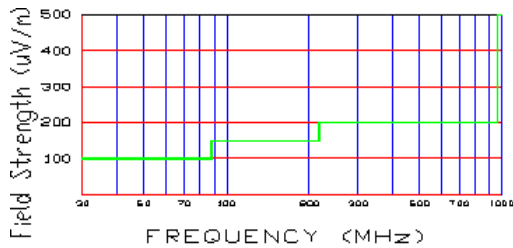
FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 11 of 20	

### 7.3 Radiated Measurement Data

**§15.109; RSS-Gen (6(a))**

Frequency [MHz]	Level [dBm]	AFCL [dB]	PoI [H/V]	Height [m]	Azimuth [degrees]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
36.40	-84.90	11.72	H	1.3	15	33.82	40.00	-6.18
61.90	-88.33	15.65	H	1.2	46	34.32	40.00	-5.68
194.90	-89.76	12.21	V	1.4	24	29.45	43.52	-14.07
388.30	-94.59	11.30	V	1.3	194	23.72	46.02	-22.30
453.50	-85.52	14.40	V	1.3	24	35.88	46.02	-10.14
517.00	-95.86	17.63	V	1.1	35	28.77	46.02	-17.25

**Table 7-2. Radiated Measurements at 3-meters**





**Figure 7-1. 3 Meter Limits**

**NOTES:**

1. All modes of operation were investigated and the worst-case emissions are reported.
2. Radiated Emissions were measured from 30MHz – 2000MHz.
3. The radiated limits are shown on Figure 7-1. Above 960MHz the limit is 500 $\mu$ V/m.

1. All readings are calibrated by Agilent E8257D (250kHz – 20GHz) PSG Signal Generator with accuracy traceable to the National Institute of Standards and Technology (NIST).
2. AFCL = Antenna Factor (Roberts dipole) and Cable Loss (30 ft. RG58C/U).
3. Measurements made using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used with a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

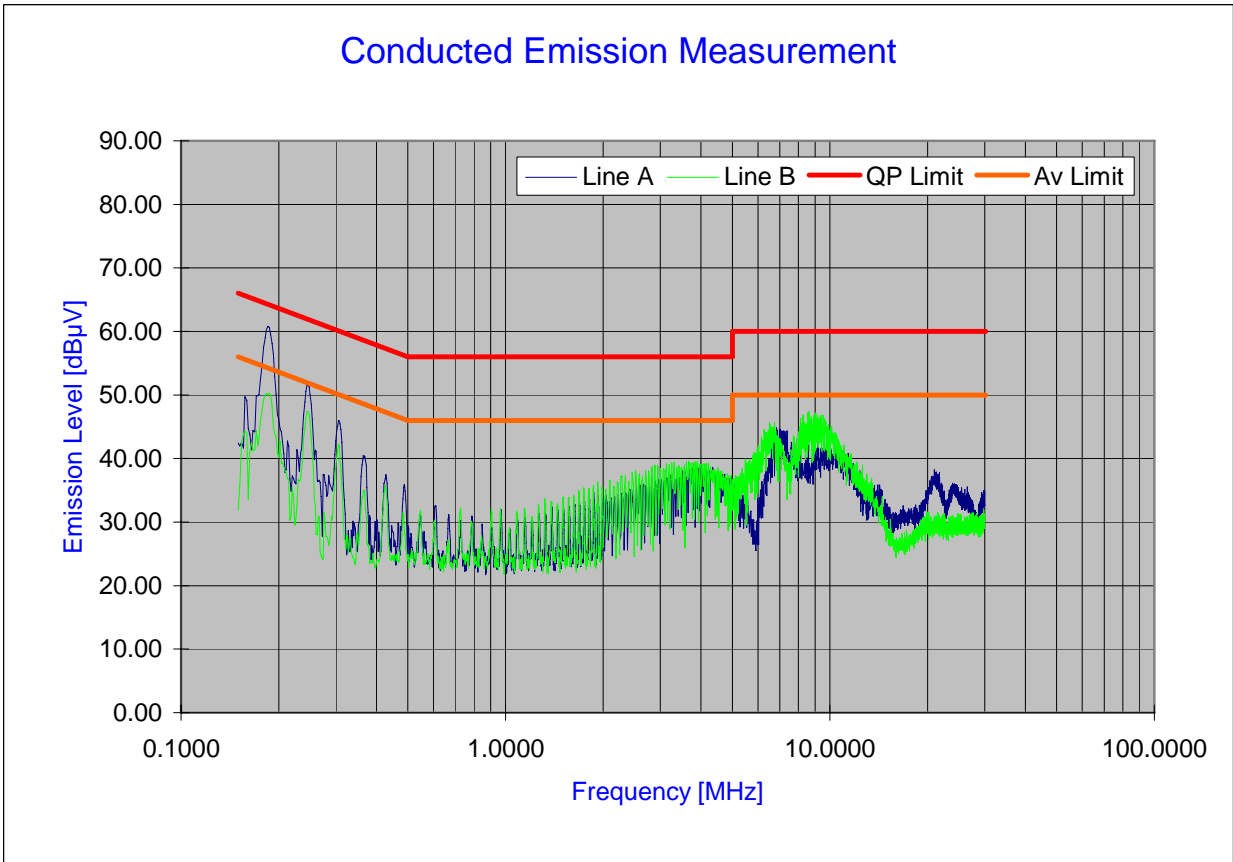
FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 12 of 20	

**7.4 Line Conducted Measurement Data**  
**§15.107; RSS-Gen (7.2.2)**

# PCTEST Engineering Laboratory Inc.

Company : Samsung Electronics, Co. Ltd.  
 Model Number : GT-S5233W  
 FCC ID Code : A3LGTS5233W  
 Standard : FCC Part 15B class B

Power Source : AC120V/60Hz  
 Tested Date : 06/24/2009





Ver.1.1 ©PCTEST 2006.08

**Plot 7-1. Line-Conducted Test Plot**

**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.107 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. Deviations to the Specifications: None.

<b>FCC ID:</b> A3LGTS5233W		<b>FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0906221262.A3L	<b>Test Dates:</b> June 24, 2009	<b>EUT Type:</b> 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 13 of 20	



**Line Conducted Measurement Data (Cont'd)**  
**§15.107; RSS-Gen (7.2.2)**

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBμV]	Limit [dBμV]	Margin [dB]	Average [dBμV]	Limit [dBμV]	Margin [dB]
1	A	0.150	8.20	43.49	66.00	-22.51	33.99	56.00	-22.01
2	A	0.183	8.01	57.22	64.34	-7.12	41.63	54.34	-12.71
3	A	0.243	7.78	47.96	61.98	-14.02	36.85	51.98	-15.13
4	A	0.304	7.57	42.96	60.14	-17.18	29.78	50.14	-20.36
5	A	4.337	7.49	36.26	56.00	-19.74	33.93	46.00	-12.07
6	A	6.757	7.55	42.09	60.00	-17.91	35.69	50.00	-14.31
7	A	6.878	7.55	41.80	60.00	-18.20	38.21	50.00	-11.79
8	A	6.997	7.55	41.81	60.00	-18.19	33.08	50.00	-16.92
9	A	7.243	7.56	40.82	60.00	-19.18	32.62	50.00	-17.38
10	A	7.598	7.56	37.93	60.00	-22.07	25.82	50.00	-24.18
11	B	0.182	8.02	48.52	64.37	-15.85	38.67	54.37	-15.70
12	B	6.552	7.54	42.60	60.00	-17.40	37.24	50.00	-12.76
13	B	6.738	7.55	42.40	60.00	-17.60	37.31	50.00	-12.69
14	B	8.111	7.57	42.04	60.00	-17.96	34.38	50.00	-15.62
15	B	8.294	7.58	43.12	60.00	-16.88	30.00	50.00	-20.00
16	B	8.642	7.58	43.83	60.00	-16.17	34.15	50.00	-15.85
17	B	8.723	7.58	43.79	60.00	-16.21	34.83	50.00	-15.17
18	B	9.083	7.59	42.97	60.00	-17.03	33.59	50.00	-16.41
19	B	9.432	7.59	41.51	60.00	-18.49	33.76	50.00	-16.24
20	B	9.675	7.60	40.78	60.00	-19.22	31.47	50.00	-18.53

**Table 7-3. Line-Conducted Test Data**



**Notes:**

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.107 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. Deviations to the Specifications: None.

FCC ID: A3LGTS5233W		FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0906221262.A3L	Test Dates: June 24, 2009	EUT Type: 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 14 of 20	

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN FCC ID: A3LGTS5233W** has been tested to comply with the requirements specified in §15.107 and §15.109 of the FCC Rules.

<b>FCC ID:</b> A3LGTS5233W		<b>FCC Pt. 15B MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0906221262.A3L	<b>Test Dates:</b> June 24, 2009	<b>EUT Type:</b> 850/1900 GSM/GPRS/EDGE Phone with Bluetooth and WLAN	Page 15 of 20	