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MEASUREMENT REPORT FCC PART 15.249 ANT+

Applicant Name:
Samsung Electronics, Co. Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do 443-742, Korea


Date of Testing:
01/29-2/20/2014
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
0Y1401270212.A3L

FCC ID:	A3LSMG900A
APPLICANT:	Samsung Electronics, Co. Ltd.

Application Type: Certification
Model(s): SM-G900A
EUT Type: Portable Handset
Frequency Range: 2402 – 2480MHz
FCC Classification: Low Power Transceiver, Rx Verified (DXT)
FCC Rule Part(s): Part 15 Subpart C (15.249)
Test Procedure(s): ANSI C63.10-2009, KDB 648474 D03 v01r02

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2009. Test results reported herein relate only to the item(s) tested.

I 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.


 Randy Ortanez
 President







FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 1 of 24	

TABLE OF CONTENTS

FCC PART 15.249 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 DEVICE CAPABILITIES.....		5
2.3 TEST CONFIGURATION.....		5
2.4 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS.....		5
2.5 LABELING REQUIREMENTS.....		5
3.0 DESCRIPTION OF TEST		6
3.1 EVALUATION PROCEDURE.....		6
3.2 AC LINE CONDUCTED EMISSIONS.....		6
3.3 RADIATED EMISSIONS		7
4.0 ANTENNA REQUIREMENTS.....		8
5.0 TEST EQUIPMENT CALIBRATION DATA.....		9
6.0 TEST RESULTS		10
6.1 SUMMARY.....		10
6.2 OCCUPIED BANDWIDTH MEASUREMENT.....		11
6.3 DUTY CYCLE CALCULATION.....		12
6.4 FUNDAMENTAL FIELD STRENGTH LEVEL MEASUREMENT.....		14
6.5 RADIATED SPURIOUS EMISSION MEASUREMENTS.....		15
6.6 RADIATED RESTRICTED BAND EDGE MEASUREMENTS.....		18
6.7 LINE CONDUCTED MEASUREMENT DATA.....		22
7.0 CONCLUSION		24

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 2 of 24	



MEASUREMENT REPORT

FCC Part 15.249

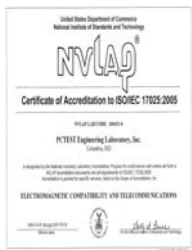
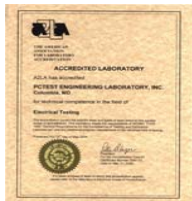


§ 2.1033 General Information



APPLICANT: Samsung Electronics, Co. Ltd.
APPLICANT ADDRESS: 129, Samsung-ro, Maetan dong,
 Yeongtong-gu, Suwon-si, Gyeonggi-do 443-742, Korea
TEST SITE: PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21046 USA
FCC RULE PART(S): Part 15 Subpart C (15.249)
MODEL: SM-G900A
FCC ID: A3LSMG900A
Test Device Serial No.: 20F7D, 20F7F Production Pre-Production Engineering
FCC CLASSIFICATION: Low Power Transceiver, Rx Verified (DXT)
DATE(S) OF TEST: 01/29-2/20/2014
TEST REPORT S/N: 0Y1401270212.A3L

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located 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 to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- 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.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 3 of 24	

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

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 4 of 24	

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG900A**. The test data contained in this report pertains only to the emissions due to the EUT's ANT+ transmitter.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Band 17 (5, 10MHz BW), 5 (1.4, 3, 5, 10MHz BW), 4 (1.4, 3, 5, 10, 15, 20MHz BW), 2 (1.4, 3, 5, 10, 15, 20MHz BW) LTE, 802.11a/b/g/n/ac WLAN (DTS/NII), Bluetooth (1x,EDR, LE), NFC, ANT+

Note: This device is capable of operating in hopping and non-hopping mode. The EUT can hop between 79 different channels in the 2400 – 2483.5MHz band.

2.3 Test Configuration

The Samsung Portable Handset FCC ID: A3LSMG900A was tested per the guidance of ANSI C63.10-2009. See Sections 3.2, 3.3, and 6.1 of this test report for a description of the AC line conducted emissions, radiated emissions, and antenna port conducted emissions test setups, respectively.

This device supports a wireless charging cover. Additional emissions testing were performed per KDB 648474 D03 v01r02. The handset was placed on the representative charging pad under normal conditions and in a simulated call configuration. The additional worst case emissions are reported herein and identified as WCC.



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.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 5 of 24	

3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009) was used in the measurement of the **Samsung Portable Handset FCC ID: A3LSMG900A**.

Deviation from measurement procedure.....None



3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. 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 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. 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 second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

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 and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 6.6. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 8.51.0.



FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 6 of 24	

3.3 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.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 7 of 24	

4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”



- The antennas of the Samsung Portable Handset are **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **Samsung Portable Handset FCC ID: A3LSMG900A** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)
00	2402
:	:
39	2441
:	:
78	2480

Table 4-1. Frequency/ Channel Operations

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 8 of 24	

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
-	BT2	Bluetooth Cable Set	1/27/2014	Annual	1/27/2015	N/A
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	3/29/2013	Annual	3/29/2014	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	3/29/2013	Annual	3/29/2014	N/A
Agilent	8447D	Broadband Amplifier	5/31/2013	Annual	5/31/2014	2443A01900
Agilent	N9020A	MXA Signal Analyzer	10/29/2013	Annual	10/29/2014	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	1/17/2014	Annual	1/17/2015	MY52350166
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/24/2013	Biennial	7/24/2015	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
Mini-Circuits	VHF-3100+	High Pass Filter	1/27/2014	Annual	1/27/2015	30841
Mini-Circuits	VHF-3100+	High Pass Filter	1/29/2014	Annual	1/29/2015	31144
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	1/24/2014	Annual	1/24/2015	100348
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100040
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	6/20/2013	Biennial	6/20/2015	310233
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

Note:

For equipment listed above that has a calibration due date that falls within the test date range, care was taken to ensure that this equipment was utilized prior to the calibration due date.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 9 of 24	

6.0 TEST RESULTS

6.1 Summary



Company Name: Samsung Electronics, Co. Ltd.
 FCC ID: A3LSMG900A
 Method/System: Frequency Hopping Spread Spectrum (FHSS)
 Number of Channels: 79

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (Tx)					
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 6.2
15.35(c)	Duty Cycle Calculation	N/A	RADIATED	N/A	Section 6.3
15.249(a)(e)	Fundamental Field Strength Level	< 50 mV/m		PASS	Section 6.4
15.249(a)(e)	Harmonic Field Strength Level	< 500 μ V/m		PASS	Section 6.5
15.205, 15.209, 15.249(d)(e)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< 15.209 limits (RSS-210 table 3 limits) or 50dB below the level of the fundamental		PASS	Sections 6.5, 6.6
15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Section 6.7

Table 6-1. Summary of Test Results

Notes:

- 1) All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 10 of 24	

6.2 Occupied Bandwidth Measurement

\$2.1049

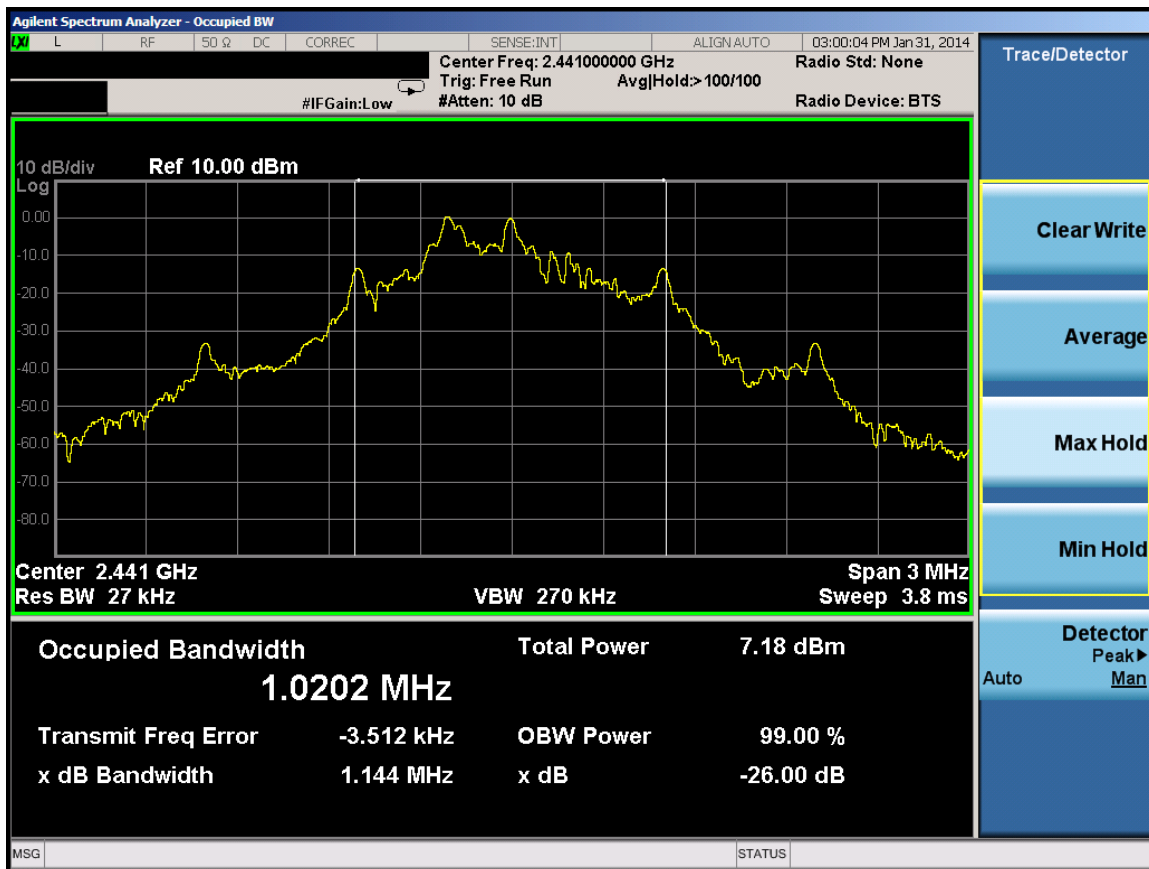
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The spectrum analyzers' "occupied bandwidth" measurement function was used to record the occupied bandwidth.

Frequency [MHz]	Channel No.	Operating Mode	Measured Bandwidth [kHz]
2441	39	ANT+ (non-hop)	1020.2

Table 6-2. Occupied Bandwidth Measurement



Figure 6-1. Test Instrument & Measurement Setup



Plot 6-1. Occupied Bandwidth Plot (ANT+ – Ch. 39)

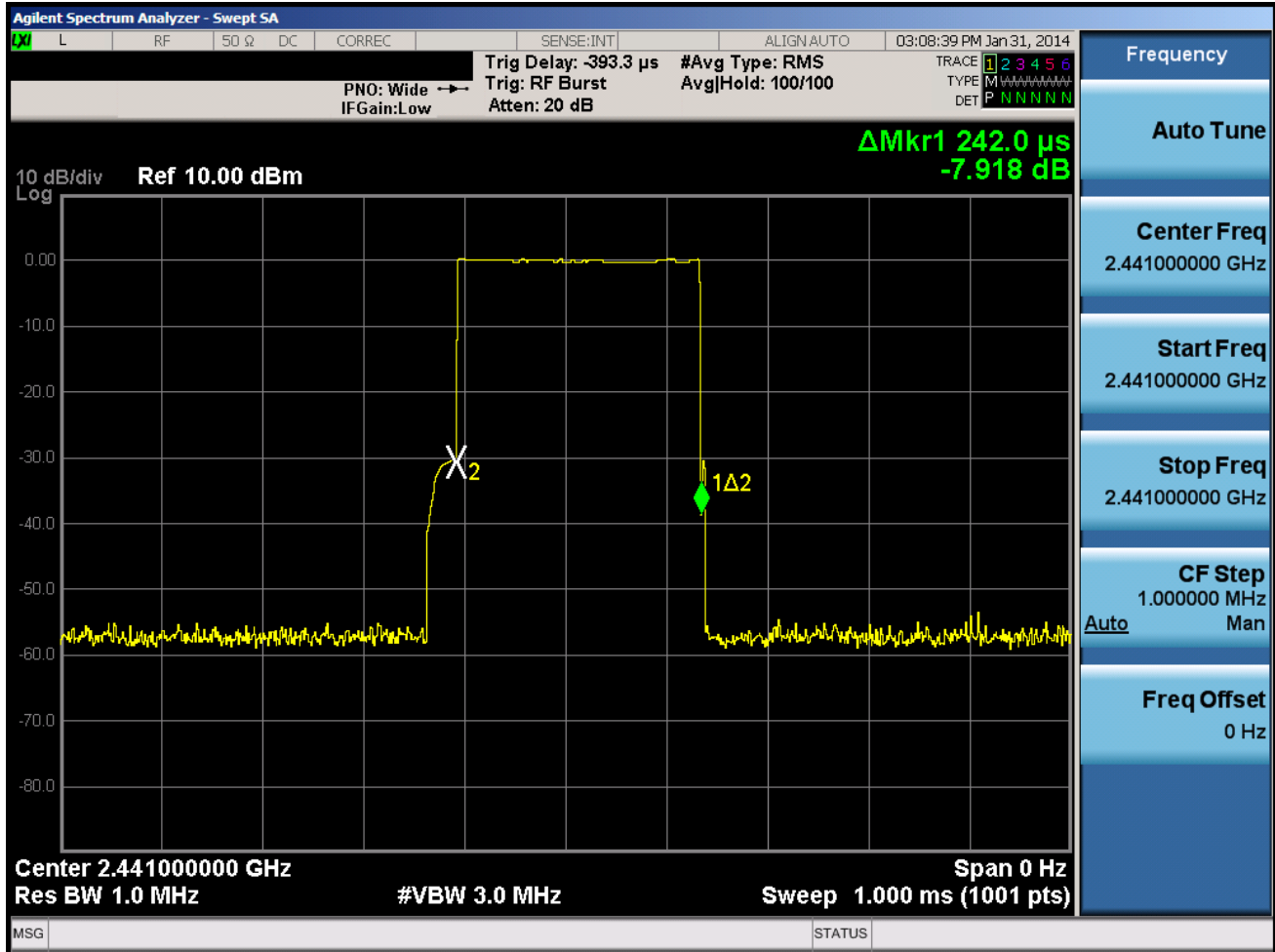
FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 11 of 24

6.3 Duty Cycle Calculation

§15.35(c)

Per FCC Part 15.35(c), an average radiated field strength can be determined by applying a duty cycle correction factor to a measured peak radiated field strength level. The duty cycle correction factor is determined based on the worst case operation over a 100ms time period on any given channel. Two plots are included below to determine the appropriate duty cycle correction factor.

In Plot 6-2 below, it is shown that the pulse width for one transmission burst of the ANT+ transmitter while operating in non-hopping mode is 242.0µs.



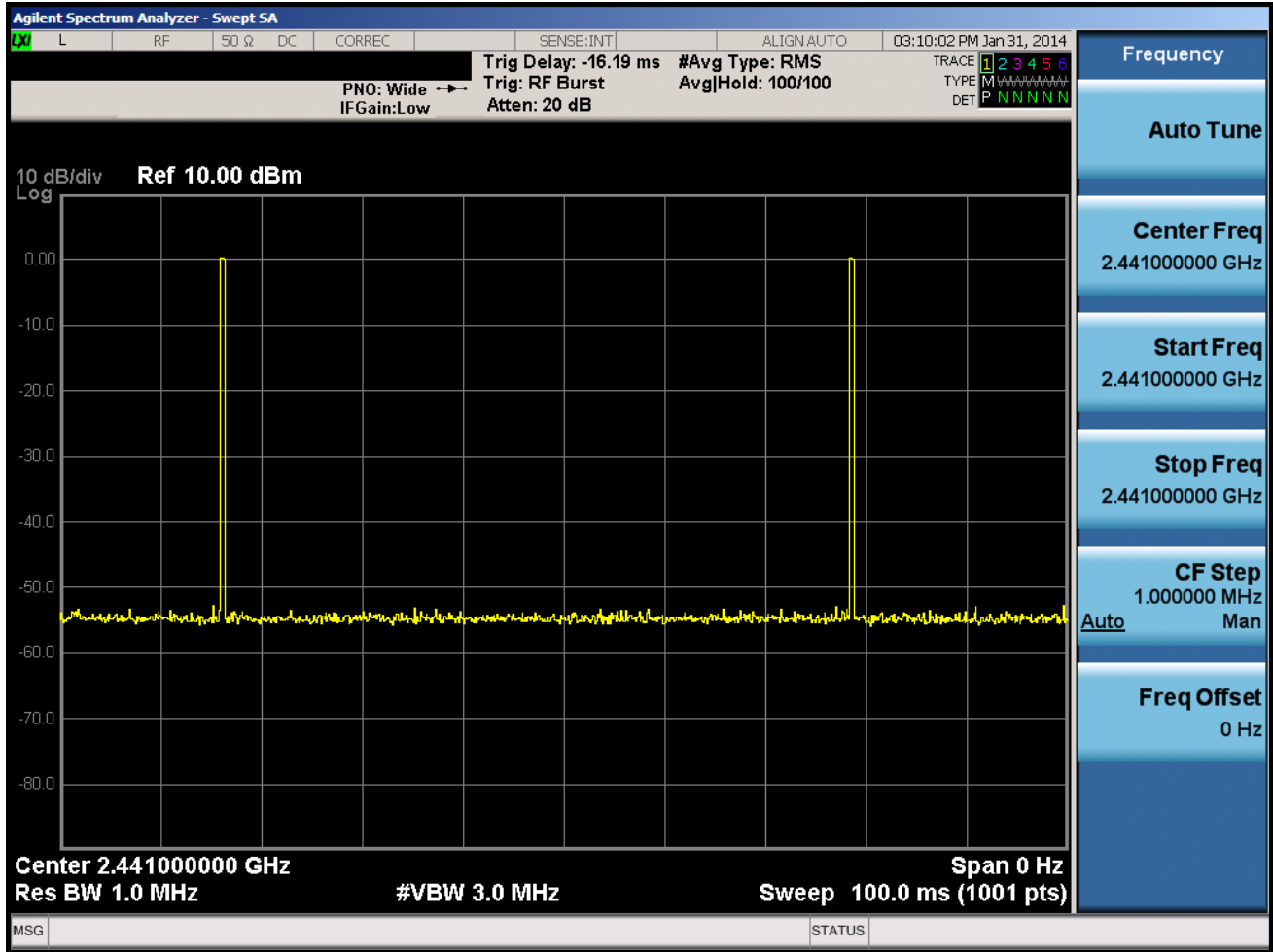
Plot 6-2. Pulse Width Measurement

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 12 of 24

Duty Cycle Calculation (Cont'd)

\$15.35(c)

In Plot 6-3 below, a video trigger is used to determine the maximum number of times the transmitter operates at maximum power over a 100ms period.



Plot 6-3. Worst Case 100ms Operation

Since it is determined that the transmitter burst appears a maximum of 2 times over a 100ms window with a pulse width of 242.0µs, then the appropriate duty cycle correction factor is determined from the following formula, based on 15.35(c):

$$\begin{aligned} \text{DCCF} &= 10\log_{10}(\text{number of hits} \times (\text{worst case 100ms operation} / 100\text{ms})) \\ &= 10\log_{10}(2 \times (0.242\text{ms}/100\text{ms})) = -23.15\text{dB} \end{aligned}$$

DCCF = -23.15dB

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 13 of 24

6.4 Fundamental Field Strength Level Measurement

§15.249(a)(e)

Measurement is made while the EUT is operating in non-hopping transmission mode. The field strengths shown below were measured using a spectrum analyzer. Peak field strength measurements are performed in the analyzers' swept spectrum mode using a peak detector with RBW = 3MHz and VBW ≥ RBW. Average field strength data is determined by applying the duty cycle correction factor (DCCF) found in Section 6.3 to the measured peak field strength values.



The maximum permissible average field strength level is 50mV/m (93.98dBμV/m). The maximum permissible peak field strength level is 500mV/m (113.98 dBμV/m).

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dBμV/m]	Duty Cycle Correction [dB]	Corrected Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
2402.00	-52.02	Peak	H	35.71	90.69	-23.15	67.54	93.98	-26.44
2402.00	-52.02	Peak	H	35.71	90.69	0.00	90.69	113.98	-23.29
2441.00	-47.19	Peak	H	35.86	95.67	-23.15	72.52	93.98	-21.46
2441.00	-47.19	Peak	H	35.86	95.67	0.00	95.67	113.98	-18.31
2480.00	-46.11	Peak	H	36.00	96.89	-23.15	73.74	93.98	-20.24
2480.00	-46.11	Peak	H	36.00	96.89	0.00	96.89	113.98	-17.09

Table 6-3. Field Strength Measurements

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dBμV/m]	Duty Cycle Correction [dB]	Corrected Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
2480.00	-46.41	Peak	H	36.00	96.59	-23.15	73.44	93.98	-20.54
2480.00	-46.41	Peak	H	36.00	96.59	0.00	96.59	113.98	-17.39

Table 6-4. Field Strength Measurements with WCC

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 14 of 24

6.5 Radiated Spurious Emission Measurements

§15.205 §15.209 §15.249 (d)(e)

Frequency	Field Strength [$\mu\text{V/m}$]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3



Table 6-5. Radiated Limits

Sample Calculation

- Avg. Field Strength Level $_{[\text{dB}\mu\text{V/m}]}$ = Analyzer Level $_{[\text{dBm}]} + 107 + \text{AFCL}$ $_{[\text{dB/m}]} + \text{Duty Cycle Correction}$ $_{[\text{dB}]}$
- Pk. Field Strength Level $_{[\text{dB}\mu\text{V/m}]}$ = Analyzer Level $_{[\text{dBm}]} + 107 + \text{AFCL}$ $_{[\text{dB/m}]}$
- AFCL $_{[\text{dB/m}]}$ = Antenna Factor $_{[\text{dB/m}]} + \text{Cable Loss}$ $_{[\text{dB}]}$
- Margin $_{[\text{dB}]}$ = Field Strength Level $_{[\text{dB}\mu\text{V/m}]}$ – Limit $_{[\text{dB}\mu\text{V/m}]}$

Test Notes

1. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. There were no non-harmonic emissions detected whose levels were within 20dB of the applicable limits so only harmonic emissions data is shown in this section.
2. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-5. Per 15.249(d), the radiated emissions limits from 15.209 were used since they were less than the limit of 50dB of attenuation from the measured fundamental field strength level.
3. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz.
4. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
5. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery. The standard battery for this device contains an embedded NFC antenna.
6. Peak levels at -125dBm represent the analyzer noise floor and signify that no emission was detected. No detectable emissions were found. Since the peak measurements are shown to comply with the average limits, no average spurious emissions measurements were recorded.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset	Page 15 of 24	

Radiated Spurious Emission Measurements (Cont'd)

§15.205 §15.209 §15.249 (d)(e)

Worst Case Mode: ANT+ (non-hopping)
 Measurement Distance: 3 Meters
 Operating Frequency: 2402MHz
 Channel: 0



Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	-125.00	Peak	H	40.20	22.20	53.98	-31.78
12010.00	-125.00	Peak	H	50.75	32.75	53.98	-21.23

Table 6-6. Radiated Measurements

Worst Case Mode: ANT+ (non-hopping)
 Measurement Distance: 3 Meters
 Operating Frequency: 2441MHz
 Channel: 39

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4882.00	-125.00	Peak	H	40.31	22.31	53.98	-31.67
7323.00	-125.00	Peak	H	43.01	25.01	53.98	-28.97
12205.00	-125.00	Peak	H	52.09	34.09	53.98	-19.89

Table 6-7. Radiated Measurements

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 16 of 24

Radiated Spurious Emission Measurements (Cont'd)

§15.205 §15.209 §15.249 (d)(e)

Worst Case Mode: ANT+ (non-hopping)
 Measurement Distance: 3 Meters
 Operating Frequency: 2480MHz
 Channel: 78



Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	-125.00	Peak	H	40.37	22.37	53.98	-31.61
7440.00	-125.00	Peak	H	43.02	25.02	53.98	-28.96
12400.00	-125.00	Peak	H	53.64	35.64	53.98	-18.34

Table 6-8. Radiated Measurements

Worst Case Mode: ANT+ (non-hopping)
 Measurement Distance: 3 Meters
 Operating Frequency: 2480MHz
 Channel: 78

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	-125.00	Peak	H	40.37	22.37	53.98	-31.61
7440.00	-125.00	Peak	H	43.02	25.02	53.98	-28.96
12400.00	-125.00	Peak	H	53.64	35.64	53.98	-18.34

Table 6-9. Radiated Measurements with WCC

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 17 of 24

6.6 Radiated Restricted Band Edge Measurements

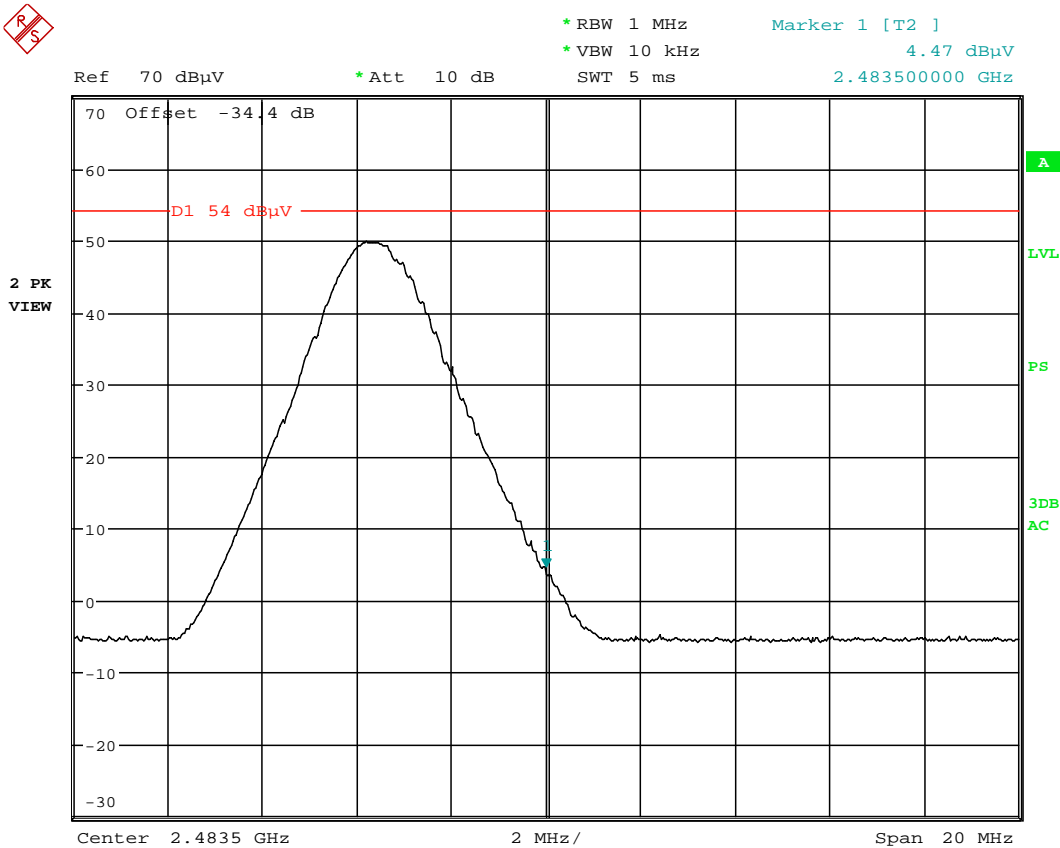
§15.205 §15.209 §15.249 (d)

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting. Two different amplitude offsets were used depending on whether peak or average measurements were measured. The average measurements use a duty cycle correction factor (DCCF).

The amplitude offset shown in the following plots for average measurements was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss}) - \text{Preamplifier Gain} + \text{DCCF}$$

Worst Case Mode: ANT+ (non-hopping)
 Measurement Distance: 3 Meters
 Operating Frequency: 2480MHz
 Back Cover: Standard
 Channel: 78



Date: 4.FEB.2014 20:35:44

Plot 6-4. Radiated Restricted Upper Band Edge Measurement (Average)

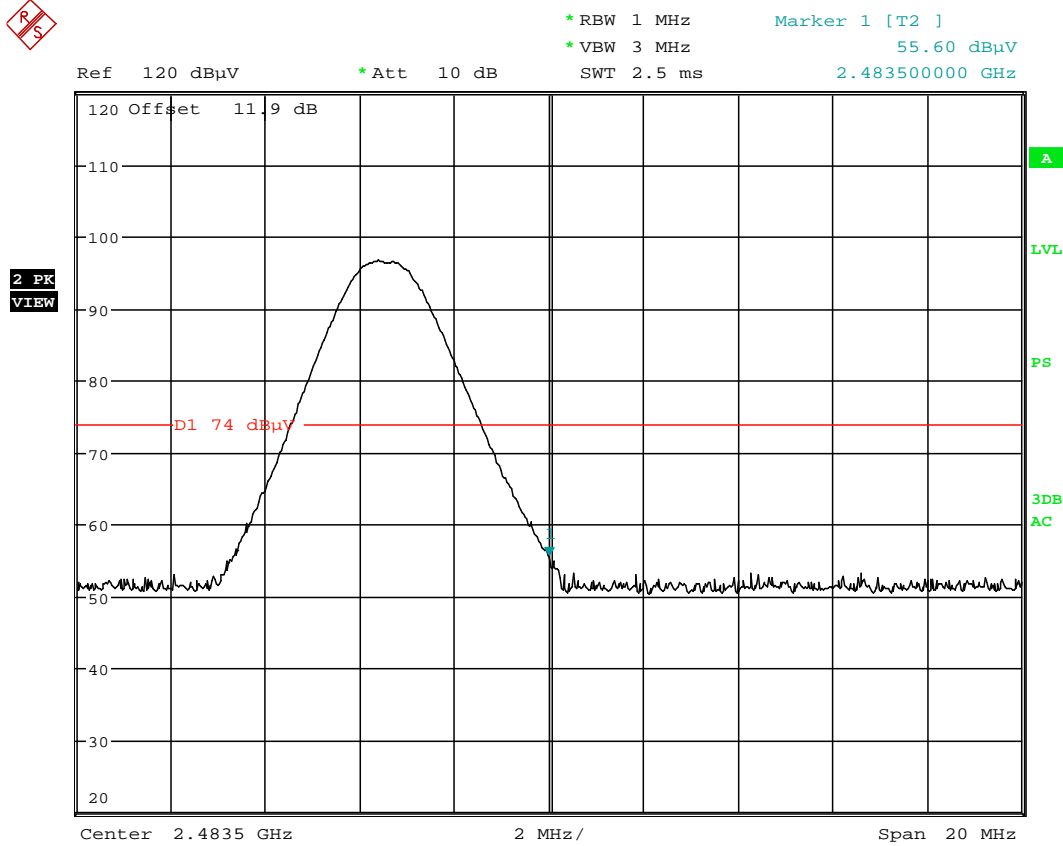
FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 18 of 24

Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.249 (d)

The amplitude offset shown in the following plots for peak measurements was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss}) - \text{Preamplifier Gain}$$



Date: 4.FEB.2014 20:36:45

Plot 6-5. Radiated Restricted Upper Band Edge Measurement (Peak)

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 19 of 24

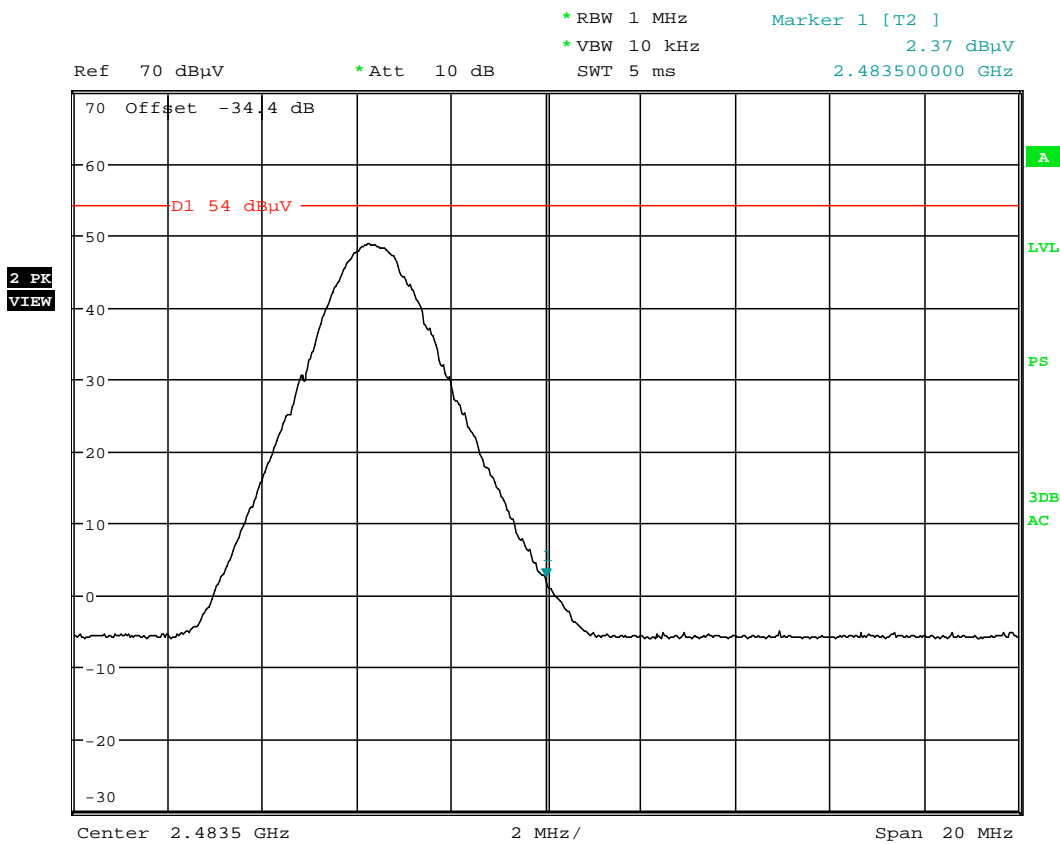
Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.249 (d)

The amplitude offset shown in the following plots for average measurements was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss}) - \text{Preamplifier Gain} + \text{DCCF}$$

Worst Case Mode: ANT+ (non-hopping)
 Measurement Distance: 3 Meters
 Operating Frequency: 2480MHz
 Back Cover: WCC
 Channel: 78



Date: 15.FEB.2014 09:01:39

Plot 6-6. Radiated Restricted Upper Band Edge Measurement with WCC (Average)

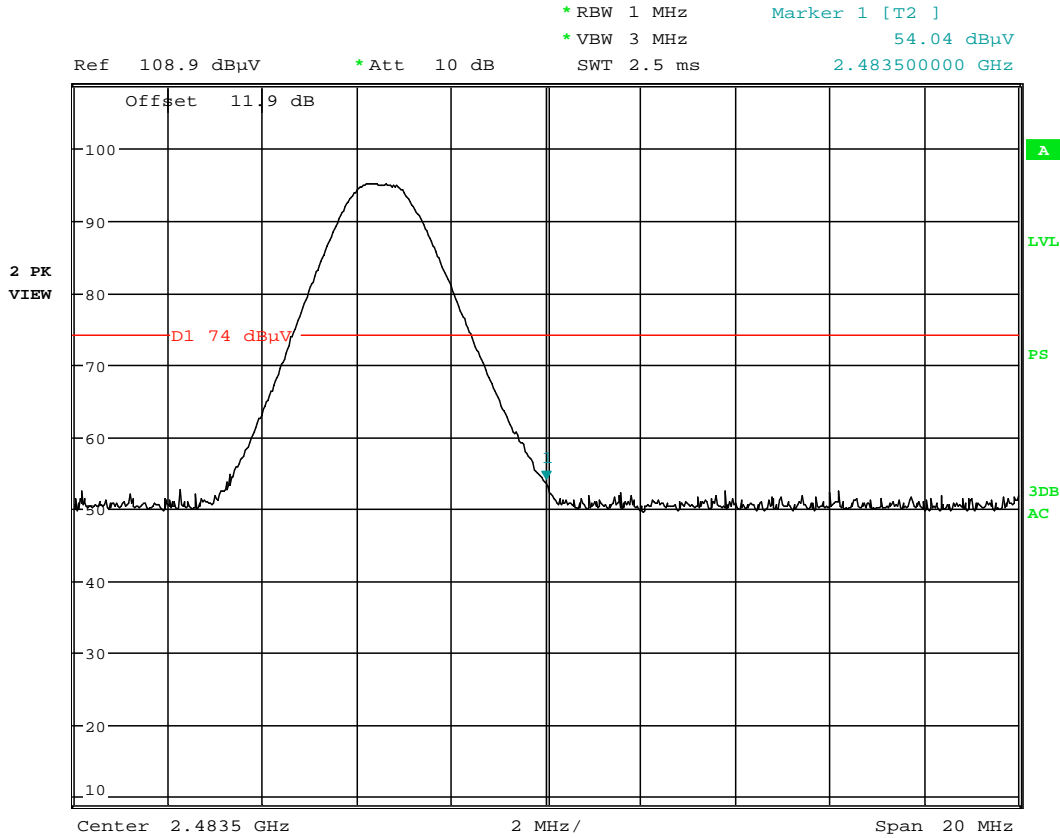
FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 20 of 24

Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 §15.209 §15.249 (d)

The amplitude offset shown in the following plots for peak measurements was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss}) - \text{Preamplifier Gain}$$



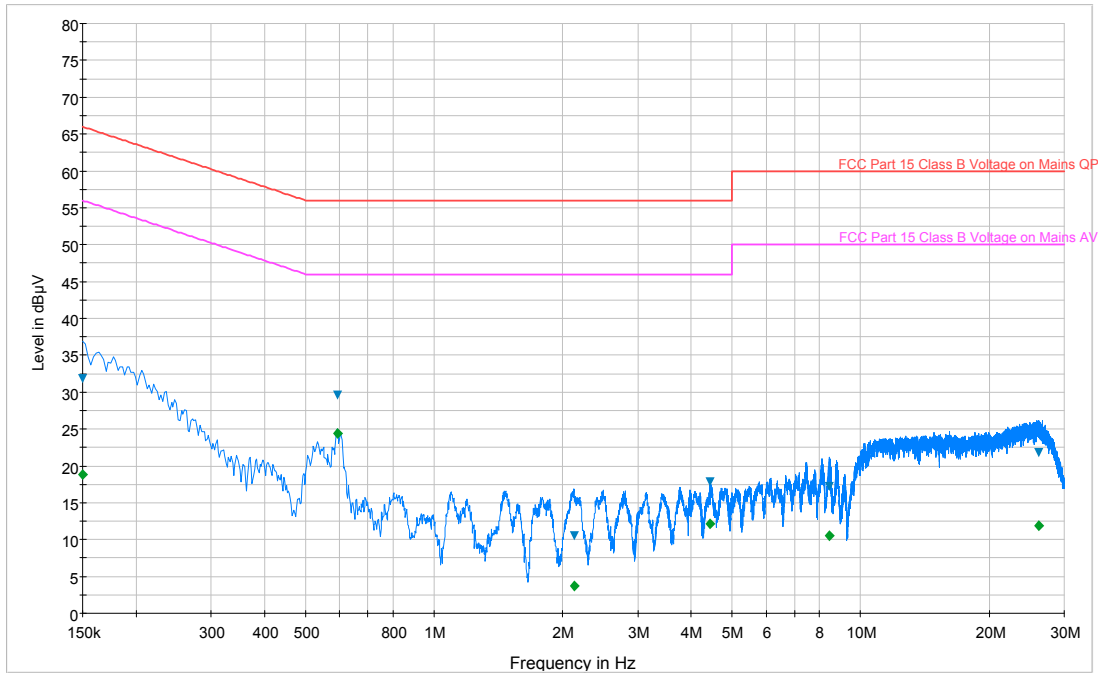
Date: 15.FEB.2014 09:00:04

Plot 6-7. Radiated Restricted Upper Band Edge Measurement with WCC (Peak)

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 21 of 24

6.7 Line Conducted Measurement Data

§15.207



— FCC Part 15 Class B Voltage on Mains QP.LimitLine — FCC Part 15 Class B Voltage on Mains AV.LimitLine — Preview Result 1-PK+
▲ Final Result 1-QPK ◆ Final Result 2-AVG

Plot 6-8. Line-Conducted Test Plot (L1)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.150	L1	0.2	31.90	66.00	34.10	18.90	56.00	37.10
0.593	L1	0.1	29.50	56.00	26.50	24.40	46.00	21.60
2.128	L1	0.1	10.50	56.00	45.50	3.70	46.00	42.30
4.439	L1	0.2	17.80	56.00	38.20	12.20	46.00	33.80
8.455	L1	0.3	17.20	60.00	42.80	10.50	50.00	39.50
26.162	L1	0.8	21.90	60.00	38.10	11.90	50.00	38.10

Table 6-10. Line-Conducted Test Data (L1)

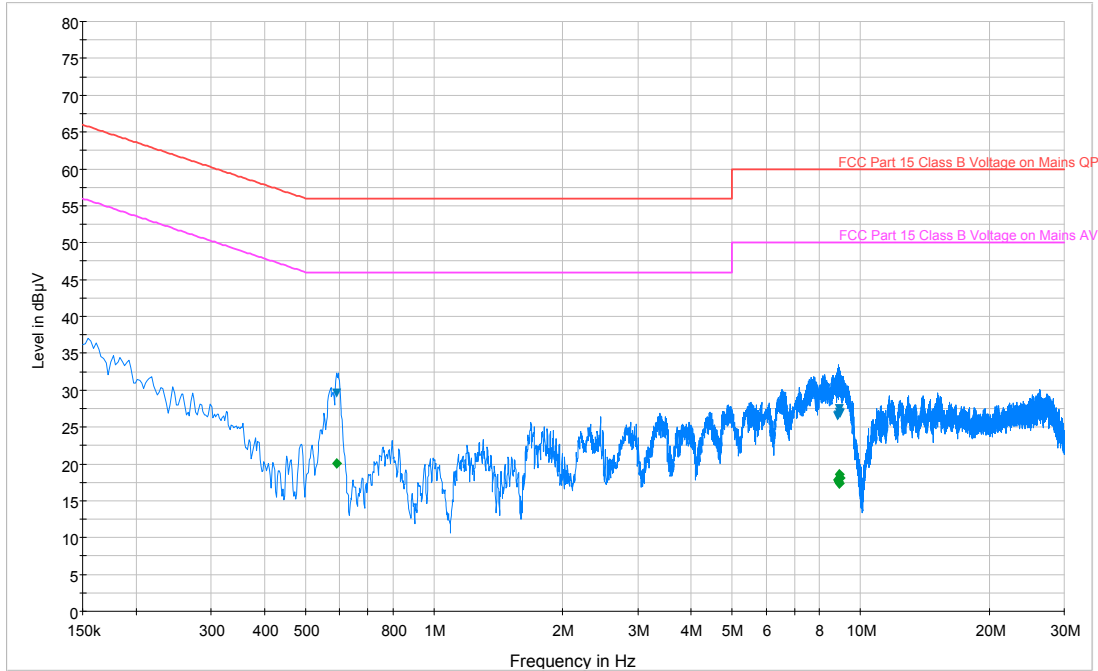
Notes:

- All Modes of operation were investigated and the worst-case emissions are reported using channel 41. The emissions found were not affected by the choice of channel used during testing.
- The limit for an intentional radiator from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
- Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
- Margin (dB) = QP/AV Limit (dBµV) - QP/AV Level (dBµV)
- Traces shown in plot are made using a peak detector.
- Deviations to the Specifications: None.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset			Page 22 of 24

Line Conducted Measurement Data (Cont'd)

§15.207



— FCC Part 15 Class B Voltage on Mains QP.LimitLine
— FCC Part 15 Class B Voltage on Mains AV.LimitLine
— Preview Result 1-PK+
◆ Final Result 1-QPK
◆ Final Result 2-AVG

Plot 6-9. Line-Conducted Test Plot (N)

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.591	N	0.1	29.60	56.00	26.40	20.00	46.00	26.00
8.833	N	0.3	26.50	60.00	33.50	17.80	50.00	32.20
8.860	N	0.3	26.70	60.00	33.30	17.60	50.00	32.40
8.894	N	0.3	27.50	60.00	32.50	17.40	50.00	32.60
8.921	N	0.3	27.00	60.00	33.00	18.50	50.00	31.50
8.952	N	0.3	26.90	60.00	33.10	18.10	50.00	31.90

Table 6-11. Line-Conducted Test Data (N)



Notes:

- All Modes of operation were investigated and the worst-case emissions are reported using channel 41. The emissions found were not affected by the choice of channel used during testing.
- The limit for an intentional radiator from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
- Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Corr. (dB)
- Margin (dB) = QP/AV Limit (dBµV) - QP/AV Level (dBµV)
- Traces shown in plot are made using a peak detector.
- Deviations to the Specifications: None.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)			Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset			Page 23 of 24

7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG900A** is in compliance with Part 15 Subpart C (15.249) of the FCC Rules.

FCC ID: A3LSMG900A		FCC Pt. 15.249 ANT+ TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1401270212.A3L	Test Dates: 01/29-2/20/2014	EUT Type: Portable Handset		Page 24 of 24