

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu Suwon-si,
Gyeonggi-do, 443-742 Rep. of Korea

Date of Issue:

March 20, 2013

Test Site/Location:

HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon,
Icheon-si, Kyunggi-Do, Korea

Report No.: HCTR1303FR07-1

HCT FRN: 0005866421

FCC ID : A3LGTS7898

APPLICANT : SAMSUNG Electronics Co., Ltd.

FCC Model(s): GT-S7898

EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz

Max. RF Output Power: Wi-Fi 802.11b(22.64 dBm) / Wi-Fi 802.11g (21.11 dBm)
/ Wi-Fi 802.11n (21.17 dBm)

Frequency Range: 2412 MHz -2462 MHz

Modulation type CCK/DSSS/OFDM

FCC Classification: Digital Transmission System(DTS)

FCC Rule Part(s): Part 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)



Report prepared by
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Test engineer of RF Team



Approved by
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FCC CERTIFICATION REPORT				www.hct.co.kr
FCC PT.15.247 TEST REPORT	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898	
Test Report No. HCTR1303FR07-1				

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1303FR07	March 05, 2013	- First Approval Report
HCTR1303FR07-1	March 20, 2013	- Including Duty Cycle Factor for Average Power -Add 802.11b/g/n Test Result for Radiated Spurious Emissions and Restricted Band Edge.

Table of Contents

1. GENERAL INFORMATION	4
2. EUT DESCRIPTION	4
3. TEST METHODOLOGY	5
3.1 EUT CONFIGURATION	5
3.2 EUT EXERCISE	5
3.3 GENERAL TEST PROCEDURES	5
3.4 DESCRIPTION OF TEST MODES	5
4. INSTRUMENT CALIBRATION.....	6
5. FACILITIES AND ACCREDITATIONS	6
5.1 FACILITIES	6
5.2 EQUIPMENT	6
6. ANTENNA REQUIREMENTS	7
7. SUMMARY TEST OF RESULTS	8
8. TEST RESULT	9
8.1 6dB BANDWIDTH (802.11b/g/n)	9
8.2 OUTPUT POWER (802.11b/g/n)	1 6
8.3 POWER SPECTRAL DENSITY (802.11b/g/n).....	8 5
8.4 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS ...	9 2
8.5 RADIATED MEASUREMENT.....	1 1 2
8.5.1 RADIATED SPURIOUS EMISSIONS.....	1 1 2
8.5.2 RADIATED RESTRICTED BAND EDGES	1 2 4
8.6 POWERLINE CONDUCTED EMISSIONS	1 2 7
9. LIST OF TEST EQUIPMENT	1 3 2

1. GENERAL INFORMATION

Applicant: SAMSUNG Electronics Co., Ltd.
Address: 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 Rep. of Korea
FCC ID: A3LGTS7898
EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz
Model name(s): GT-S7898
Date(s) of Tests: February 22, 2013 ~ March 19, 2013
Place of Tests: HCT Co., Ltd.
 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA.
 (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	
FCC Model Name	GT-S7898	
Power Supply	DC 3.7 V	
Battery type	Li-ion Battery(Standard)	
Frequency Range	TX: 2412 MHz ~ 2462 MHz RX: 2412 MHz ~ 2462 MHz	
Max. RF Output Power	Peak	Wi-Fi 802.11b(22.64 dBm) / Wi-Fi 802.11g (21.11 dBm) / Wi-Fi 802.11n (21.17 dBm)
	Average	Wi-Fi 802.11b(15.43 dBm) / Wi-Fi 802.11g (11.59 dBm) / Wi-Fi 802.11n (11.46 dBm)
Modulation Type	DSSS/CCK(802.11b), OFDM(802.11g, 802.11n)	
Antenna Specification	Manufacturer: Samsung Electronics Co., Ltd. Antenna type: Capacitor Antenna Peak Gain : -4.04 dBi	

3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.10-2009) Operating Under §15.247” were used in the measurement.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2009) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.3 of ANSI C63.10. (Version: 2009).

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 02, 2011 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

“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 this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

7. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§15.247(a)(2)	> 500 kHz	CONDUCTED	PASS
Conducted Maximum Peak Output Power	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	§15.247(d)	Conducted < 20 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 8.6		PASS
Radiated Spurious Emissions	§15.205, 15.209	cf. Section 8.5.1	RADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.5.2		PASS

8. TEST RESULT

8.1 6dB BANDWIDTH (802.11b/g/n)

Test Requirements and limit, §15.247(a)(2)

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6dB bandwidth is 500 kHz.

■ TEST CONFIGURATION

■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to

RBW = 1 – 5 % of DTS BW

VBW = 3 * RBW

SPAN = The span range for the SA display shall be between two times and five times the OBW.

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

■ TEST RESULTS

Conducted 6dB Bandwidth Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	8.074	0.500	Pass
2437	6	8.060	0.500	Pass
2462	11	8.544	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11g

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	15.150	0.500	Pass
2437	6	15.130	0.500	Pass
2462	11	15.150	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n

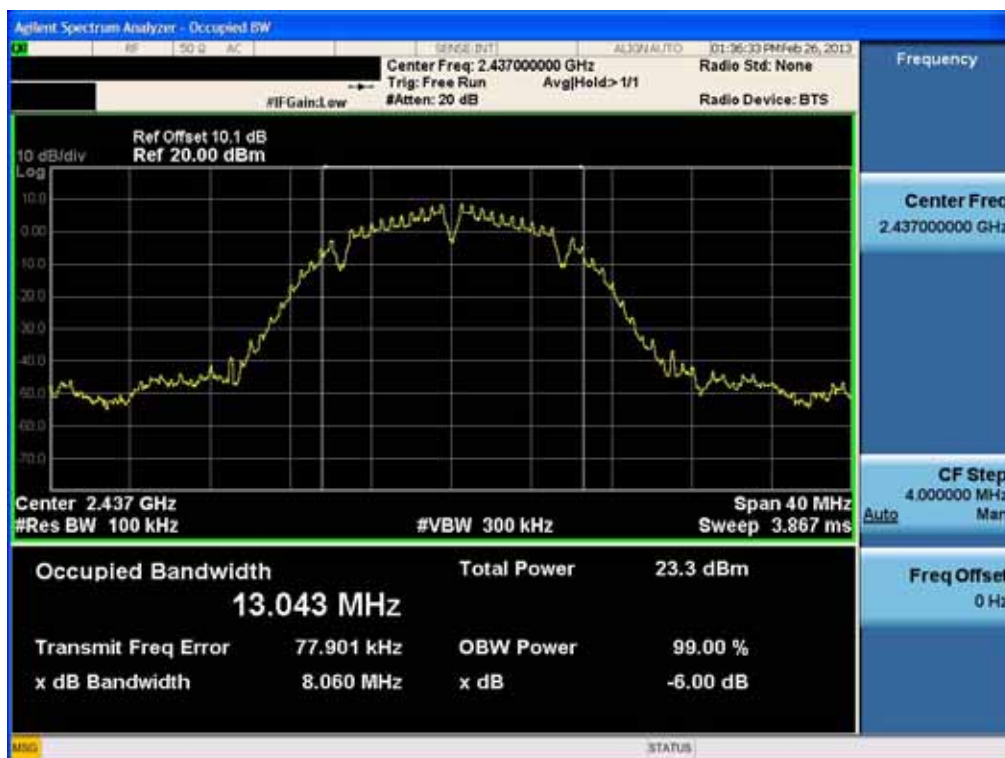
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	15.970	0.500	Pass
2437	6	15.150	0.500	Pass
2462	11	15.140	0.500	Pass

■ RESULT PLOTS

6dB Bandwidth plot (802.11b-CH 1)



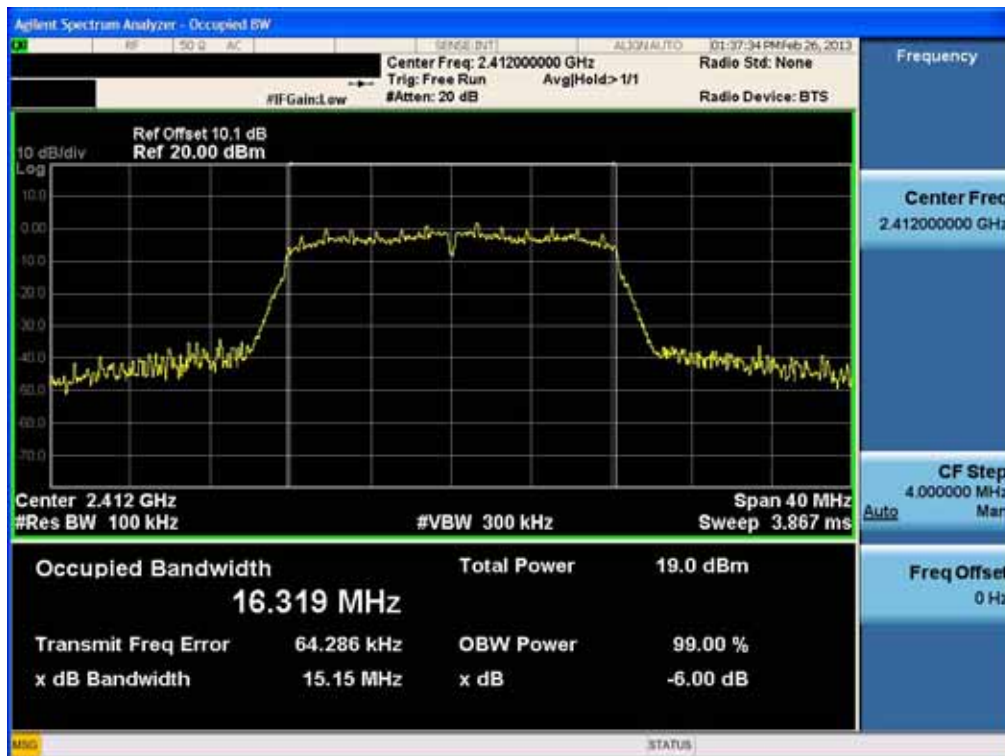
6dB Bandwidth plot (802.11b-CH 6)



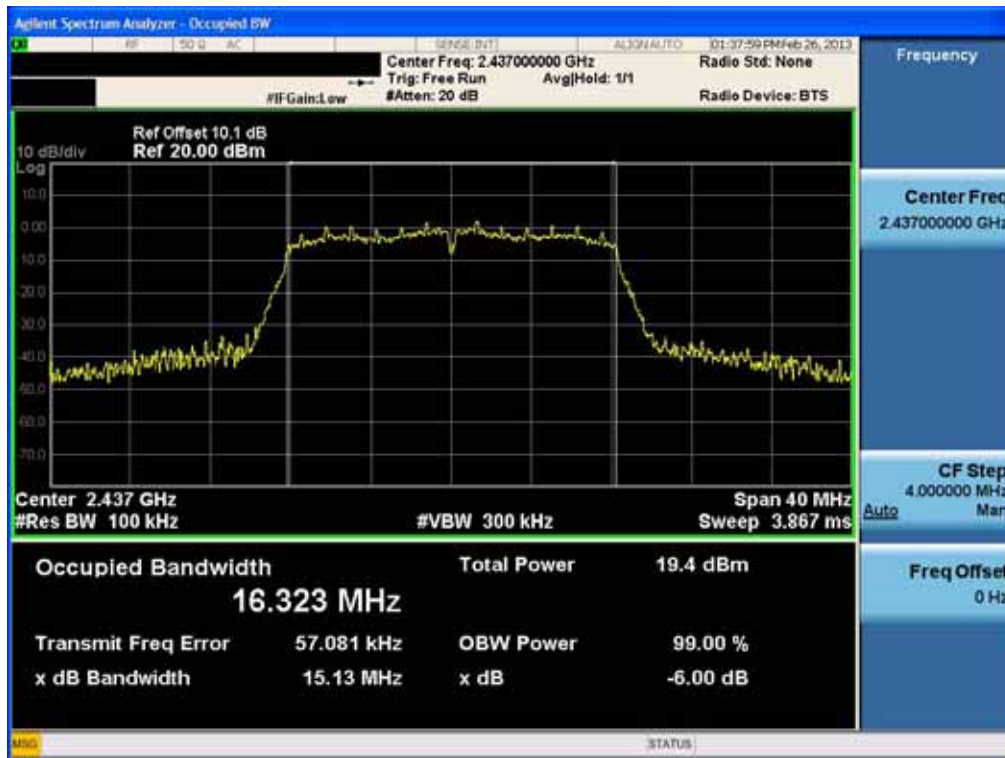
6dB Bandwidth plot (802.11b-CH 11)



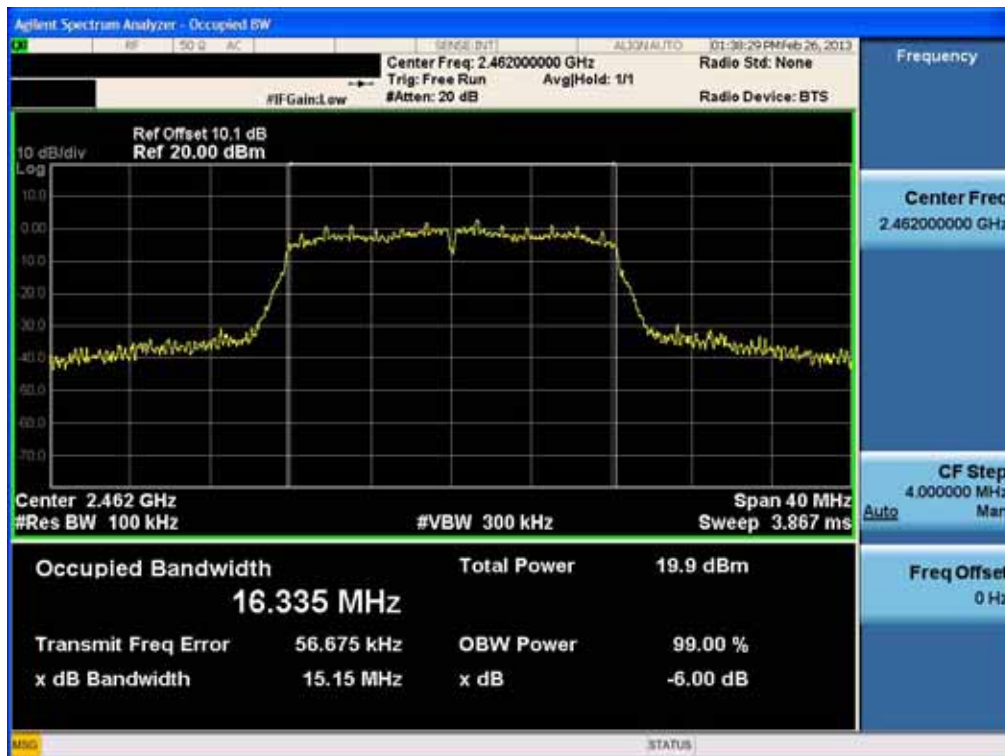
6dB Bandwidth plot (802.11g-CH 1)



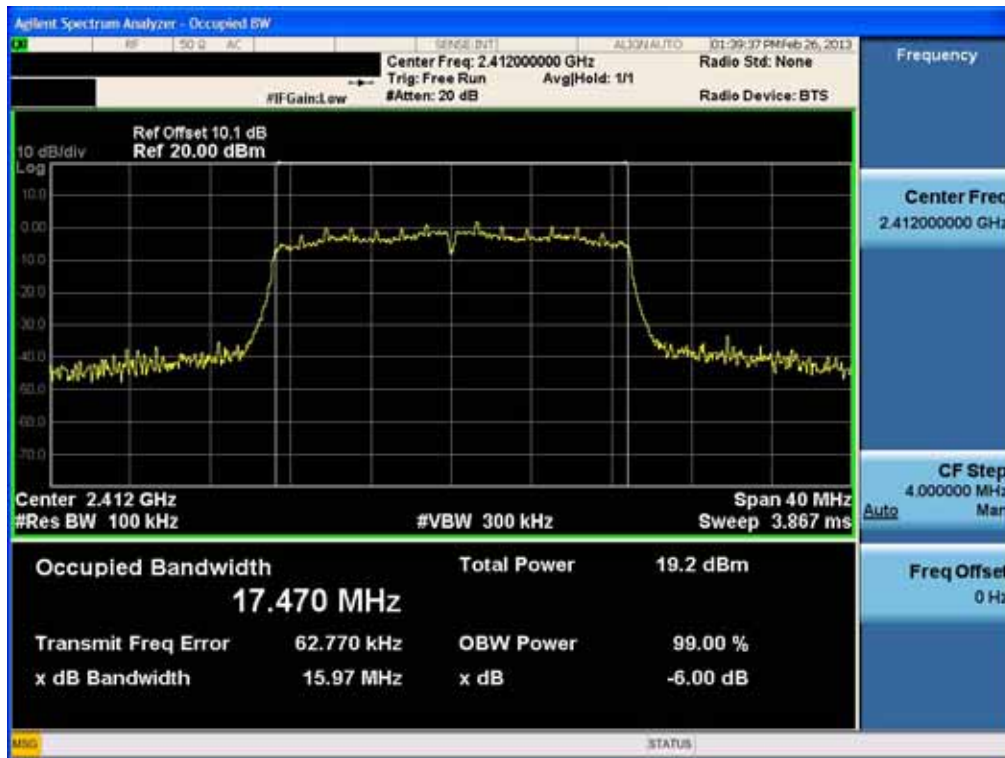
6dB Bandwidth plot (802.11g-CH 6)



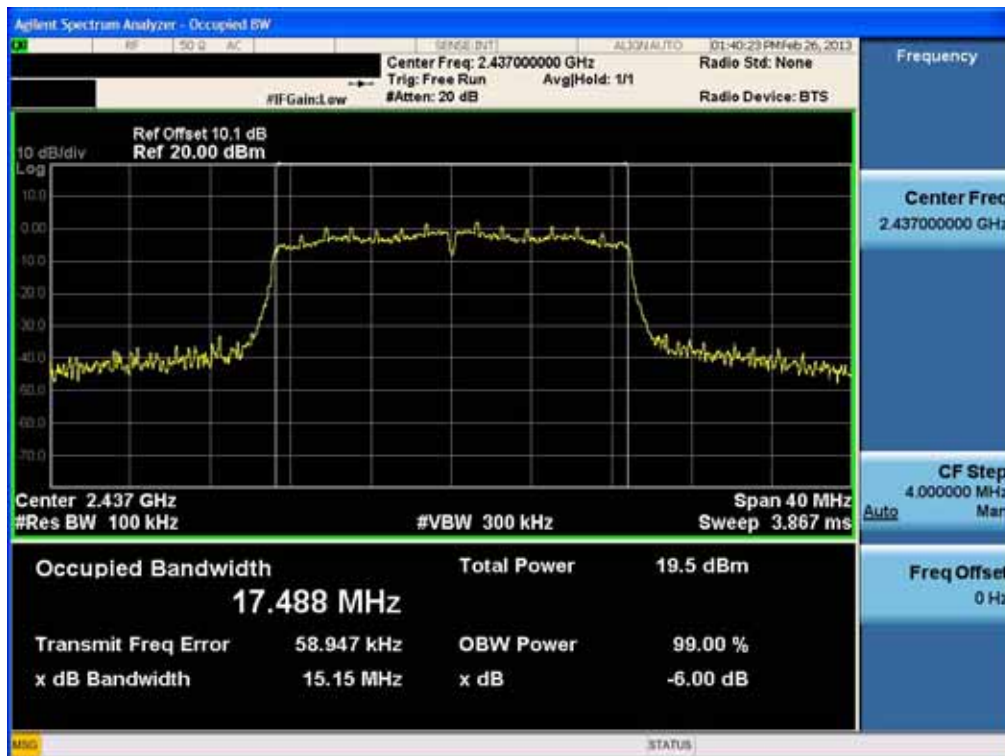
6dB Bandwidth plot (802.11g-CH 11)



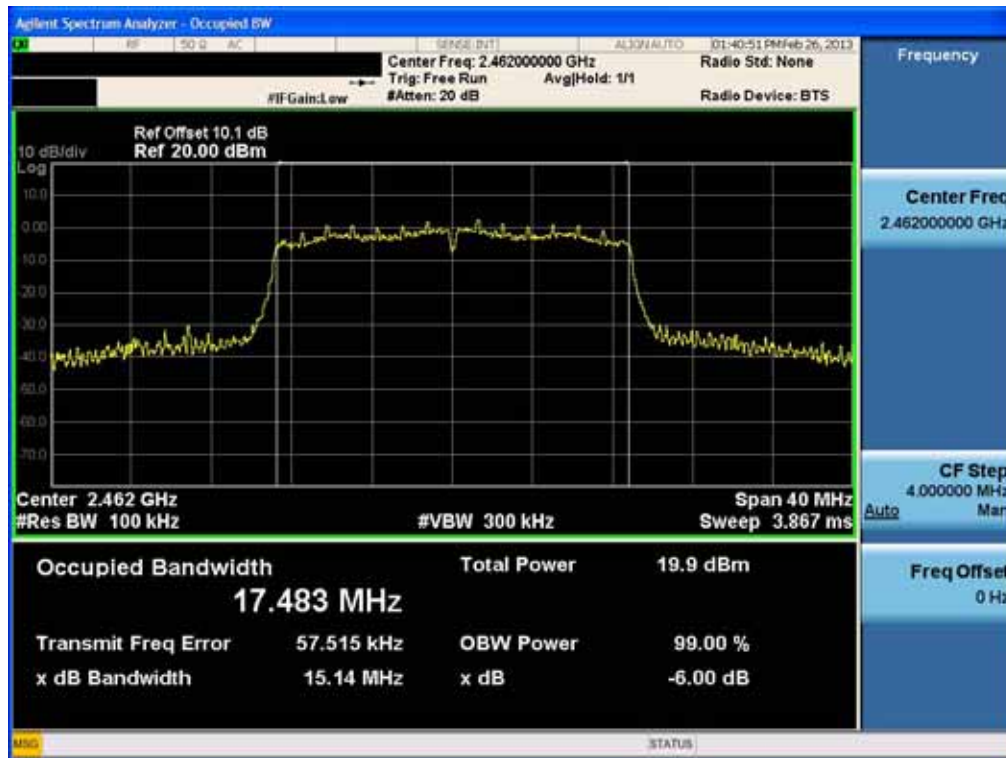
6dB Bandwidth plot (802.11n-CH 1)



6dB Bandwidth plot (802.11n-CH 6)



6dB Bandwidth plot (802.11n-CH 11)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

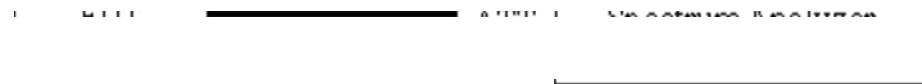
8.2 OUTPUT POWER (802.11b/g/n)

Test Requirements and limit, §15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a Spectrum Analyzer. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function. We tested according to ANSI 63.10.

This EUT TX condition is actual operating mode(duty cycle $\geq 98\%$) by WLAN test program.

The Spectrum Analyzer is set to

- Peak Power (Procedure 6.10.2.1 in ANCI 63.10)
 - RBW = 1 MHz
 - VBW = 3 MHz
 - SPAN = Set the span just large enough to capture the emission
 - Detector Mode = Peak
 - Integrated bandwidth = EBW
 - Sweep = auto couple
 - Trace Mode = max hold
 - Turn averaging off
- Average Power (Procedure 6.10.3.1 in ANSI 63.10)
 - RBW = 1 MHz
 - VBW = 3 MHz
 - SPAN = Set span to encompass the entire EBW of the signal.
 - Detector Mode = Use sample detector if bin width
 - (i.e., span/number of points in spectrum display) < 0.5 RBW.
 - Integrated bandwidth = EBW
 - Sweep = auto couple
 - Sweep Point = 1001
 - Trace average across 100 traces in power averaging mode.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

■ Sample Calculation

$$\begin{aligned}\text{Output Power} &= \text{Reading Value} + \text{ATT loss} + \text{Cable loss(1 ea)} \\ &= 10 \text{ dBm} + 10 \text{ dB} + 0.8 \text{ dB} = 20.8 \text{ dBm}\end{aligned}$$

Note :

1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.
So, 10.1 dB is offset. And the offset gap in the 2.4 GHz range do not affect the conducted peak power final result.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.11
	2437	10.10
	2462	10.12

(Actual value of loss for the attenuator and cable combination)

■ Duty Cycle Factor

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor
b	1 Mbps	8.612	8.703	0.99	0.043648054
	2 Mbps	4.303	4.398	0.978	0.096611452
	5.5 Mbps	1.626	1.72	0.945	0.245681915
	11 Mbps	0.861	0.956	0.9	0.457574906
g	6 Mbs	1.431	1.53	0.935	0.291883891
	9 Mbs	0.962	1.062	0.906	0.428718023
	12 Mbs	0.725	0.825	0.879	0.560111249
	18 Mbs	0.493	0.592	0.833	0.793549986
	24 Mbs	0.374	0.473	0.79	1.023729087
	36 Mbs	0.258	0.357	0.721	1.420647353
	48 Mbs	0.198	0.298	0.664	1.778319206
	54 Mbs	0.182	0.281	0.646	1.89767482
n	6.5 Mbs	1.336	1.434	0.932	0.305840876
	13 Mbs	0.69	0.788	0.876	0.574958938
	19.5 Mbs	0.474	0.574	0.826	0.830199527
	26 Mbs	0.366	0.465	0.787	1.040252676
	39 Mbs	0.258	0.357	0.722	1.414628024
	52 Mbs	0.202	0.301	0.671	1.732774798
	58.5 Mbs	0.186	0.285	0.651	1.864190114
	65 Mbs	0.17	0.27	0.631	1.999706408

Note : Duty Cycle Factor = $10 \cdot \log(1/\text{Duty Cycle})$

where, Duty Cycle = T_{on} / T_{total}

■ TEST RESULTS-Peak

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1 Mbps	18.27	30
		2 Mbps	18.54	30
		5.5 Mbps	20.03	30
		11 Mbps	21.87	30
2437	6	1 Mbps	18.68	30
		2 Mbps	18.94	30
		5.5 Mbps	20.41	30
		11 Mbps	22.25	30
2462	11	1 Mbps	19.20	30
		2 Mbps	19.37	30
		5.5 Mbps	20.87	30
		11 Mbps	22.64	30

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6 Mbps	19.47	30
		9 Mbps	19.66	30
		12 Mbps	19.90	30
		18 Mbps	19.87	30
		24 Mbps	20.06	30
		36 Mbps	20.13	30
		48 Mbps	20.21	30
		54 Mbps	20.34	30
2437	6	6 Mbps	19.95	30
		9 Mbps	19.98	30
		12 Mbps	20.14	30
		18 Mbps	20.20	30
		24 Mbps	20.39	30
		36 Mbps	20.48	30
		48 Mbps	20.57	30
		54 Mbps	20.69	30
2462	11	6 Mbps	20.45	30
		9 Mbps	20.51	30
		12 Mbps	20.54	30
		18 Mbps	20.62	30
		24 Mbps	20.87	30
		36 Mbps	20.94	30
		48 Mbps	21.02	30
		54 Mbps	21.11	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	19.43	30
		13 Mbps	19.44	30
		19.5 Mbps	19.53	30
		26 Mbps	19.79	30
		39 Mbps	19.88	30
		52 Mbps	19.98	30
		58.5 Mbps	20.08	30
		65 Mbps	20.24	30
2437	6	6.5 Mbps	19.91	30
		13 Mbps	20.00	30
		19.5 Mbps	20.09	30
		26 Mbps	20.33	30
		39 Mbps	20.48	30
		52 Mbps	20.56	30
		58.5 Mbps	20.67	30
		65 Mbps	20.79	30
2462	11	6.5 Mbps	20.36	30
		13 Mbps	20.45	30
		19.5 Mbps	20.53	30
		26 Mbps	20.73	30
		39 Mbps	20.86	30
		52 Mbps	20.93	30
		58.5 Mbps	21.07	30
		65 Mbps	21.17	30

■ TEST RESULTS-Average

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1 Mbps	15.09	0.04	15.13	30
		2 Mbps	14.96	0.10	15.06	30
		5.5 Mbps	14.91	0.25	15.16	30
		11 Mbps	14.77	0.46	15.23	30
2437	6	1 Mbps	14.99	0.04	15.03	30
		2 Mbps	15.18	0.10	15.28	30
		5.5 Mbps	15.30	0.25	15.55	30
		11 Mbps	15.17	0.46	15.63	30
2462	11	1 Mbps	15.22	0.04	15.26	30
		2 Mbps	15.43	0.10	15.53	30
		5.5 Mbps	15.10	0.25	15.35	30
		11 Mbps	15.39	0.46	15.85	30

Conducted Output Power Measurements (802.11g Mode)

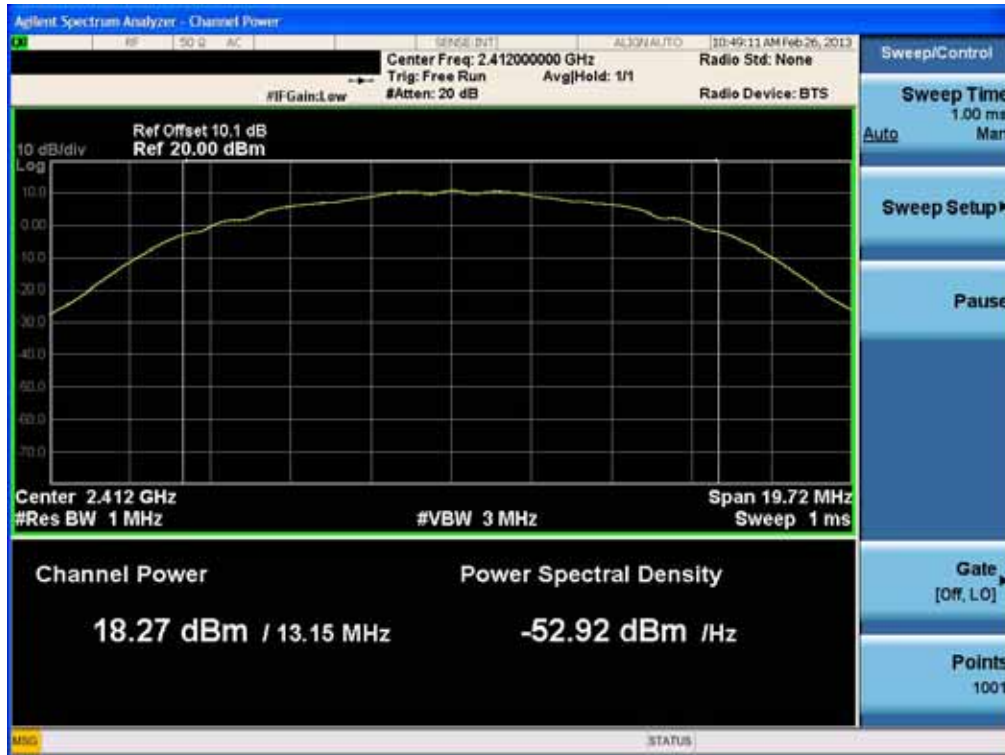
802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6 Mbps	11.13	0.29	11.42	30
		9 Mbps	10.93	0.43	11.36	30
		12 Mbps	10.74	0.56	11.30	30
		18 Mbps	10.55	0.79	11.34	30
		24 Mbps	10.38	1.02	11.40	30
		36 Mbps	9.91	1.42	11.33	30
		48 Mbps	9.63	1.78	11.41	30
		54 Mbps	9.41	1.90	11.31	30
2437	6	6 Mbps	11.57	0.29	11.86	30
		9 Mbps	11.52	0.43	11.95	30
		12 Mbps	11.30	0.56	11.86	30
		18 Mbps	10.98	0.79	11.77	30
		24 Mbps	10.78	1.02	11.80	30
		36 Mbps	10.34	1.42	11.76	30
		48 Mbps	10.04	1.78	11.82	30
		54 Mbps	9.84	1.90	11.74	30
2462	11	6 Mbps	11.57	0.29	11.86	30
		9 Mbps	11.59	0.43	12.02	30
		12 Mbps	11.04	0.56	11.60	30
		18 Mbps	11.07	0.79	11.86	30
		24 Mbps	11.02	1.02	12.04	30
		36 Mbps	10.51	1.42	11.93	30
		48 Mbps	10.09	1.78	11.87	30
		54 Mbps	10.32	1.90	12.22	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6.5 Mbps	11.05	0.31	11.36	30
		13 Mbps	10.67	0.57	11.24	30
		19.5 Mbps	10.51	0.83	11.34	30
		26 Mbps	10.30	1.04	11.34	30
		39 Mbps	9.89	1.41	11.30	30
		52 Mbps	9.54	1.73	11.27	30
		58.5 Mbps	9.44	1.86	11.30	30
		65 Mbps	9.35	2.00	11.35	30
2437	6	6.5 Mbps	11.46	0.31	11.77	30
		13 Mbps	11.14	0.57	11.71	30
		19.5 Mbps	10.94	0.83	11.77	30
		26 Mbps	10.77	1.04	11.81	30
		39 Mbps	10.37	1.41	11.78	30
		52 Mbps	9.99	1.73	11.72	30
		58.5 Mbps	9.91	1.86	11.77	30
		65 Mbps	9.68	2.00	11.68	30
2462	11	6.5 Mbps	11.36	0.31	11.67	30
		13 Mbps	11.33	0.57	11.90	30
		19.5 Mbps	11.29	0.83	12.12	30
		26 Mbps	10.85	1.04	11.89	30
		39 Mbps	10.45	1.41	11.86	30
		52 Mbps	10.49	1.73	12.22	30
		58.5 Mbps	9.98	1.86	11.84	30
		65 Mbps	9.74	2.00	11.74	30

■ RESULT PLOTS-Peak

Conducted Output Power (802.11b-CH 1) 1Mbps



Conducted Output Power (802.11b-CH 1) 2Mbps



Conducted Output Power (802.11b-CH 1) 5.5Mbps



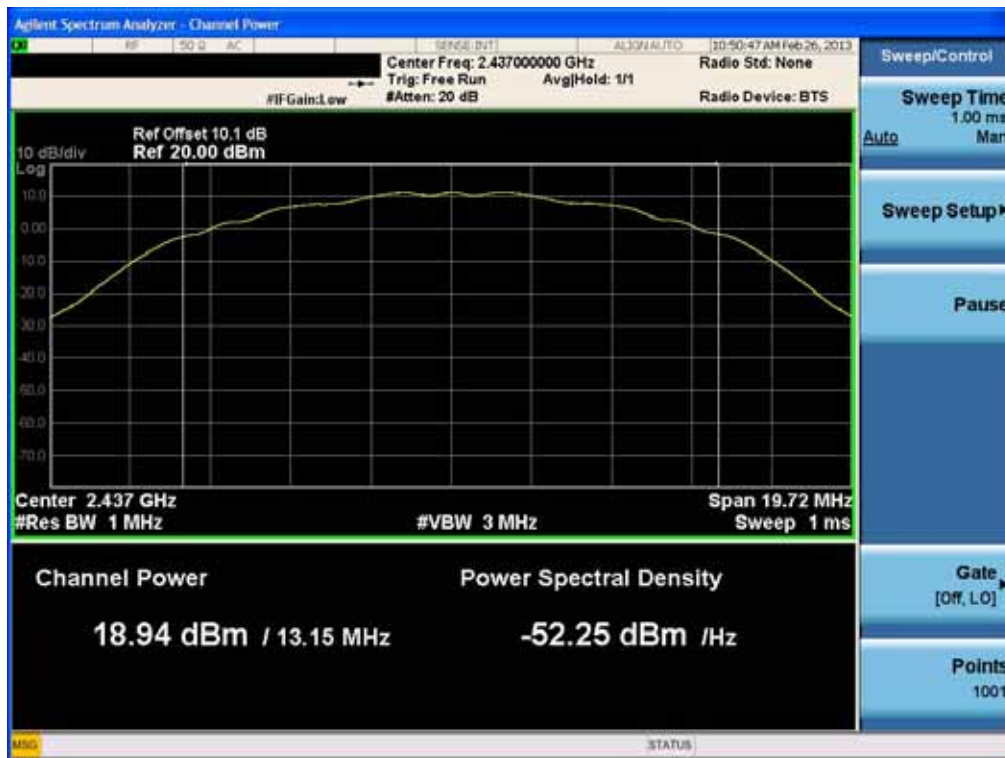
Conducted Output Power (802.11b-CH 1) 11Mbps



Conducted Output Power (802.11b-CH 6) 1Mbps



Conducted Output Power (802.11b-CH 6) 2Mbps



Conducted Output Power (802.11b-CH 6) 5.5Mbps



Conducted Output Power (802.11b-CH 6) 11Mbps



Conducted Output Power (802.11b-CH 11) 1Mbps



Conducted Output Power (802.11b-CH 11) 2Mbps



Conducted Output Power (802.11b-CH 11) 5.5Mbps



Conducted Output Power (802.11b-CH 11) 11Mbps



Conducted Output Power (802.11g-CH 1) 6Mbps



Conducted Output Power (802.11g-CH 1) 9Mbps



Conducted Output Power (802.11g-CH 1) 12Mbps



Conducted Output Power (802.11g-CH 1) 18Mbps



Conducted Output Power (802.11g-CH 1) 24Mbps



Conducted Output Power (802.11g-CH 1) 36Mbps



Conducted Output Power (802.11g-CH 1) 48Mbps



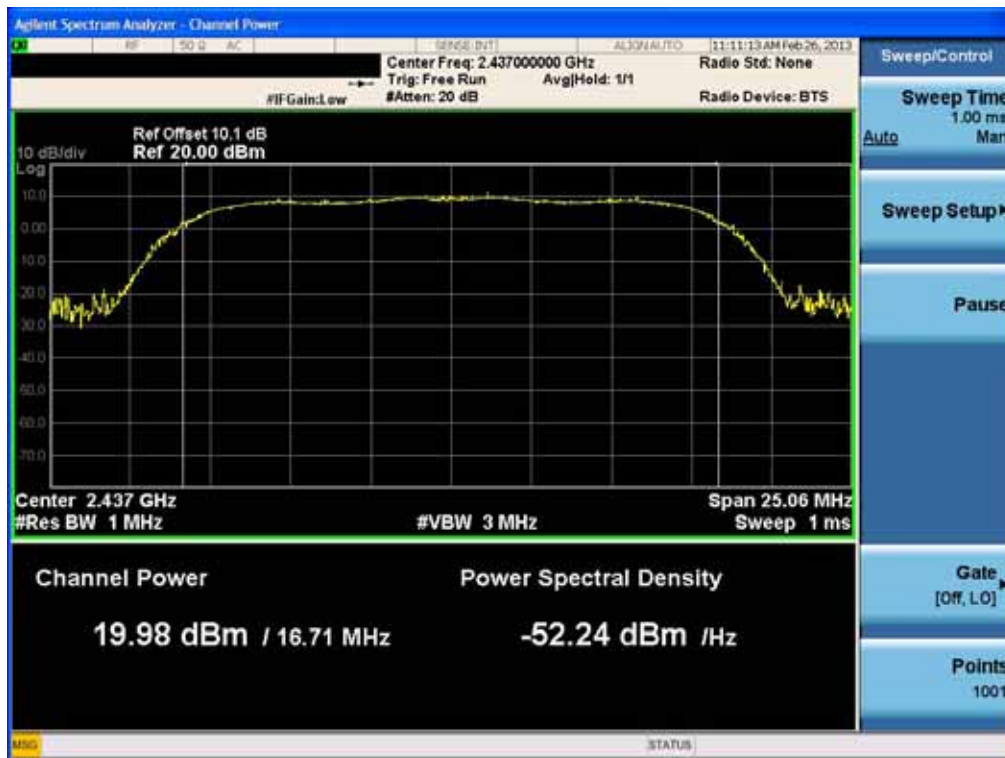
Conducted Output Power (802.11g-CH 1) 54Mbps



Conducted Output Power (802.11g-CH 6) 6Mbps



Conducted Output Power (802.11g-CH 6) 9Mbps



Conducted Output Power (802.11g-CH 6) 12Mbps



Conducted Output Power (802.11g-CH 6) 18Mbps



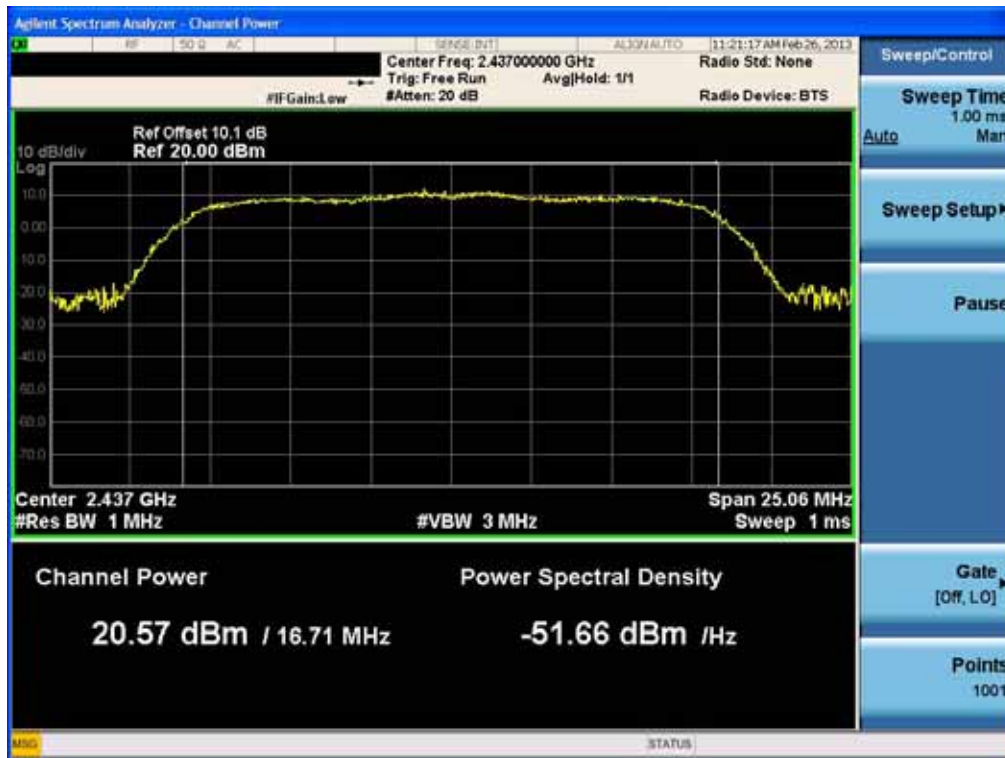
Conducted Output Power (802.11g-CH 6) 24Mbps



Conducted Output Power (802.11g-CH 6) 36Mbps



Conducted Output Power (802.11g-CH 6) 48Mbps



Conducted Output Power (802.11g-CH 6) 54Mbps



Conducted Output Power (802.11g-CH 11) 6Mbps



Conducted Output Power (802.11g-CH 11) 9Mbps



Conducted Output Power (802.11g-CH 11) 12Mbps



Conducted Output Power (802.11g-CH 11) 18Mbps



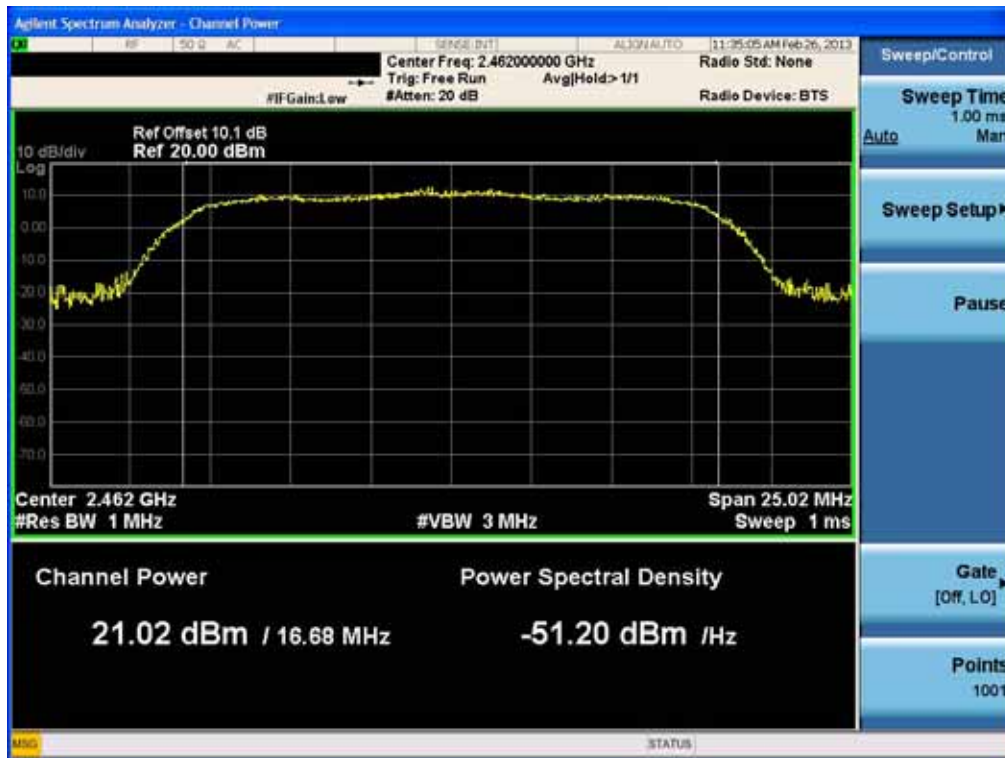
Conducted Output Power (802.11g-CH 11) 24Mbps



Conducted Output Power (802.11g-CH 11) 36Mbps



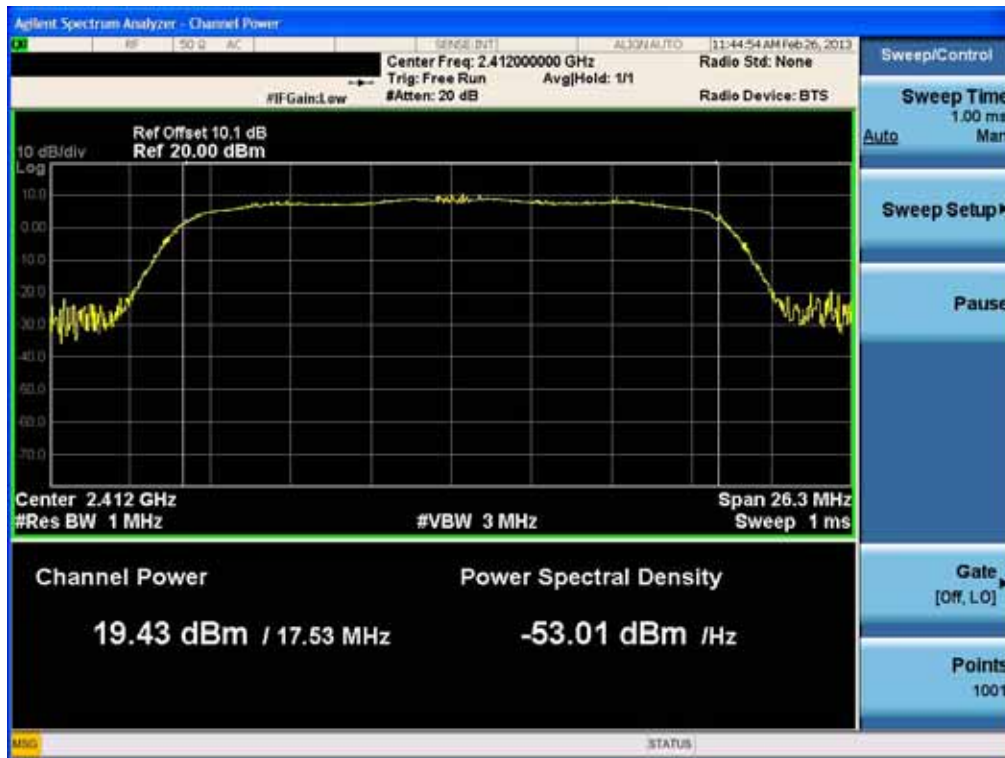
Conducted Output Power (802.11g-CH 11) 48Mbps



Conducted Output Power (802.11g-CH 11) 54Mbps



Conducted Output Power (802.11n-CH 1) 6.5Mbps



Conducted Output Power (802.11n-CH 1) 13Mbps



Conducted Output Power (802.11n-CH 1) 19.5Mbps



Conducted Output Power (802.11n-CH 1) 26Mbps



Conducted Output Power (802.11n-CH 1) 39Mbps



Conducted Output Power (802.11n-CH 1) 52Mbps



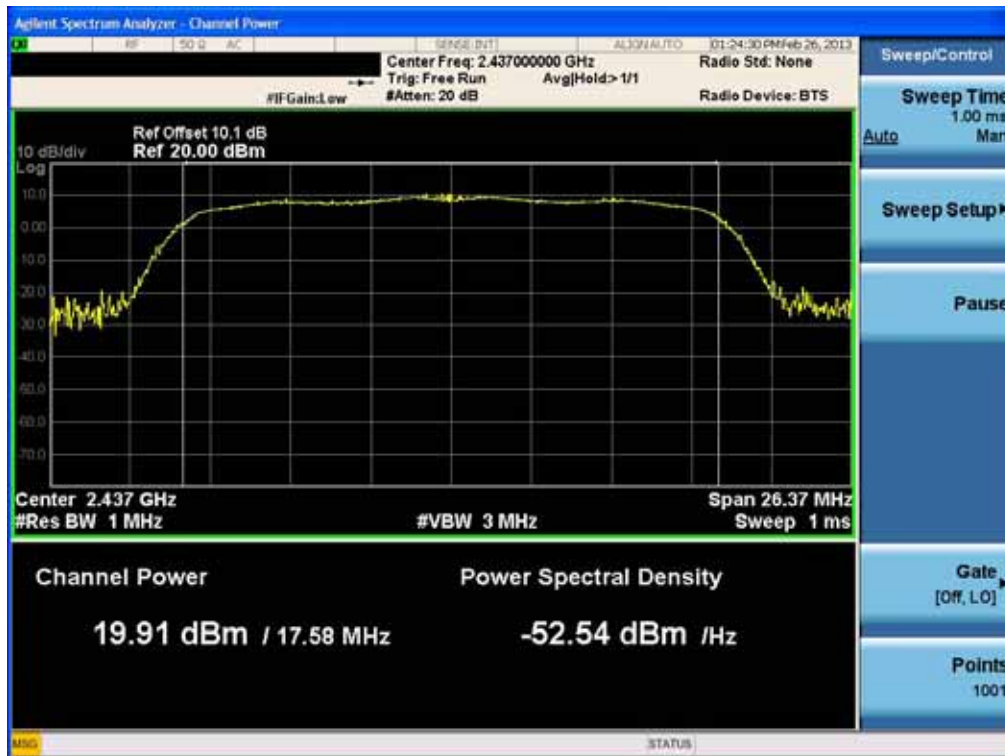
Conducted Output Power (802.11n-CH 1) 58.5Mbps



Conducted Output Power (802.11n-CH 1) 65Mbps



Conducted Output Power (802.11n-CH 6) 6.5Mbps



Conducted Output Power (802.11n-CH 6) 13Mbps



Conducted Output Power (802.11n-CH 6) 19.5Mbps



Conducted Output Power (802.11n-CH 6) 26Mbps



Conducted Output Power (802.11n-CH 6) 39Mbps



Conducted Output Power (802.11n-CH 6) 52Mbps



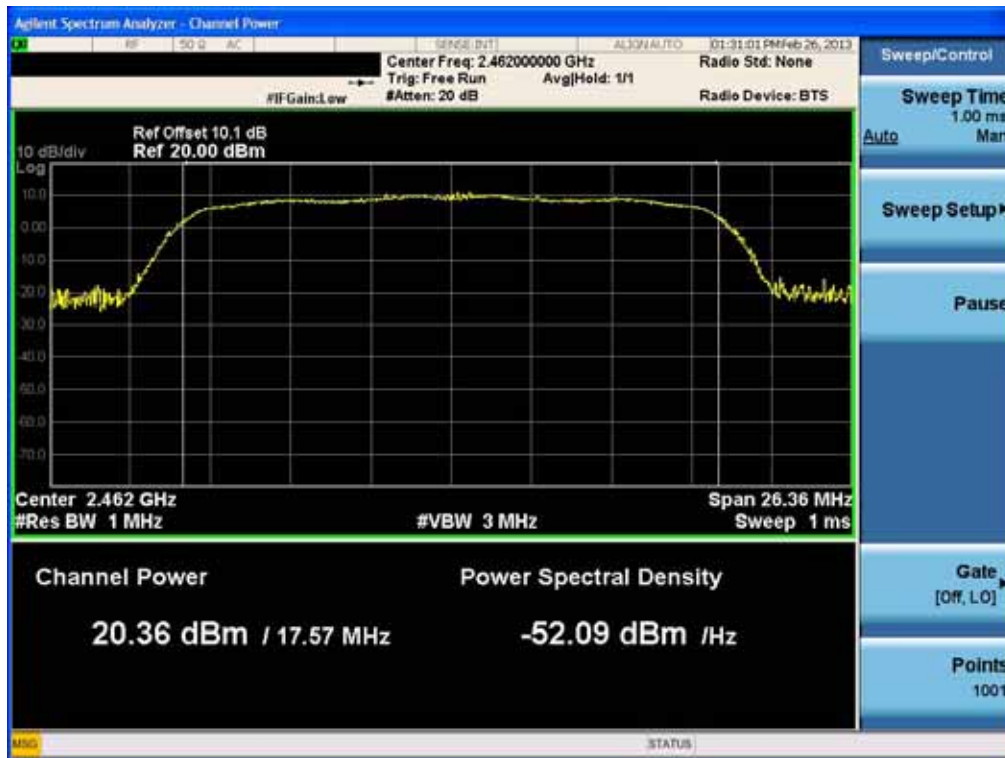
Conducted Output Power (802.11n-CH 6) 58.5Mbps



Conducted Output Power (802.11n-CH 6) 65Mbps



Conducted Output Power (802.11n-CH 11) 6.5Mbps



Conducted Output Power (802.11n-CH 11) 13Mbps



Conducted Output Power (802.11n-CH 11) 19.5Mbps



Conducted Output Power (802.11n-CH 11) 26Mbps



Conducted Output Power (802.11n-CH 11) 39Mbps



Conducted Output Power (802.11n-CH 11) 52Mbps



Conducted Output Power (802.11n-CH 11) 58.5Mbps

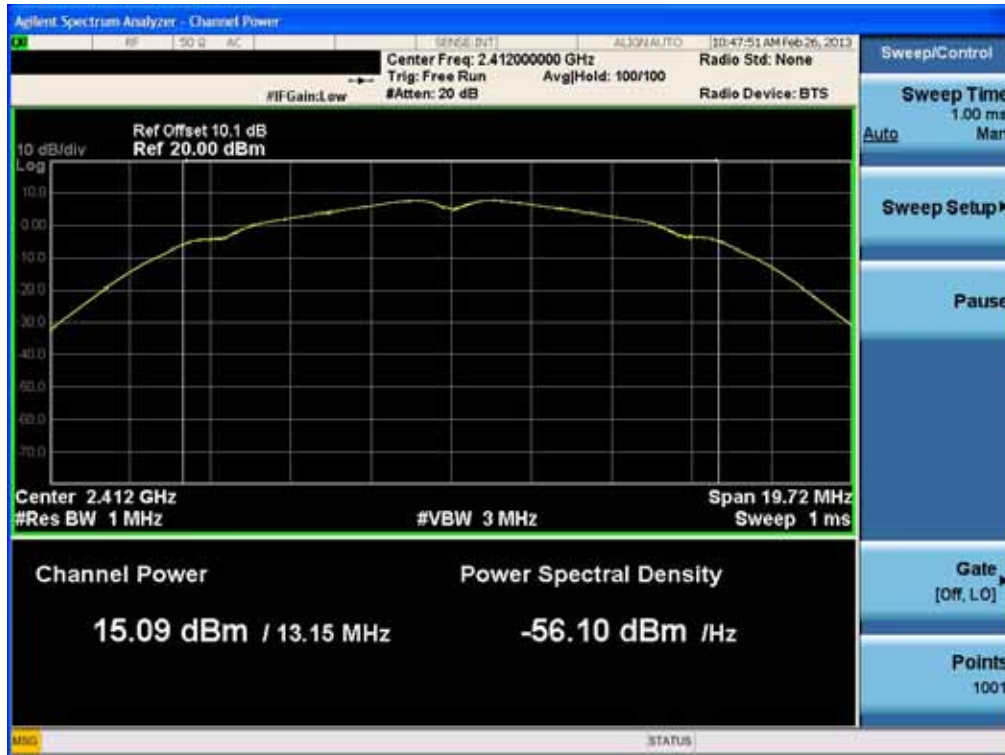


Conducted Output Power (802.11n-CH 11) 65Mbps



RESULT PLOTS-Average

Conducted Output Power (802.11b-CH 1) 1Mbps



Conducted Output Power (802.11b-CH 1) 2Mbps



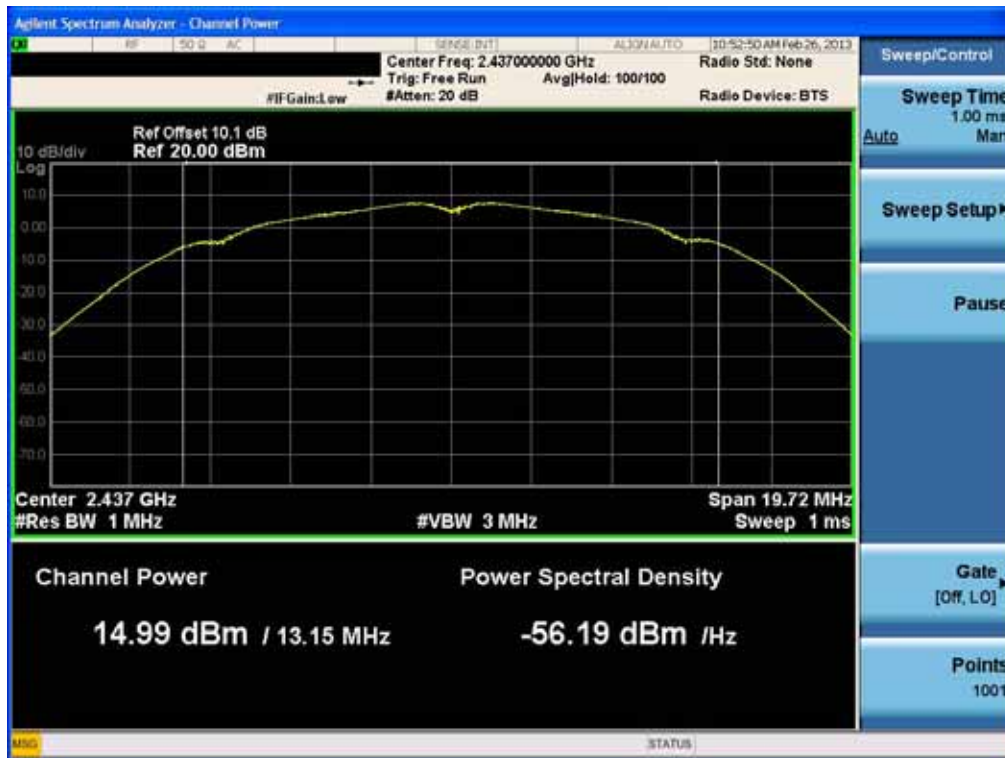
Conducted Output Power (802.11b-CH 1) 5.5Mbps



Conducted Output Power (802.11b-CH 1) 11Mbps



Conducted Output Power (802.11b-CH 6) 1Mbps



Conducted Output Power (802.11b-CH 6) 2Mbps



Conducted Output Power (802.11b-CH 6) 5.5Mbps



Conducted Output Power (802.11b-CH 6) 11Mbps



Conducted Output Power (802.11b-CH 11) 1Mbps



Conducted Output Power (802.11b-CH 11) 2Mbps



Conducted Output Power (802.11b-CH 11) 5.5Mbps



Conducted Output Power (802.11b-CH 11) 11Mbps



Conducted Output Power (802.11g-CH 1) 6Mbps



Conducted Output Power (802.11g-CH 1) 9Mbps



Conducted Output Power (802.11g-CH 1) 12Mbps



Conducted Output Power (802.11g-CH 1) 18Mbps



Conducted Output Power (802.11g-CH 1) 24Mbps



Conducted Output Power (802.11g-CH 1) 36Mbps



Conducted Output Power (802.11g-CH 1) 48Mbps



Conducted Output Power (802.11g-CH 1) 54Mbps



Conducted Output Power (802.11g-CH 6) 6Mbps



Conducted Output Power (802.11g-CH 6) 9Mbps



Conducted Output Power (802.11g-CH 6) 12Mbps



Conducted Output Power (802.11g-CH 6) 18Mbps



Conducted Output Power (802.11g-CH 6) 24Mbps



Conducted Output Power (802.11g-CH 6) 36Mbps



Conducted Output Power (802.11g-CH 6) 48Mbps



Conducted Output Power (802.11g-CH 6) 54Mbps



Conducted Output Power (802.11g-CH 11) 6Mbps



Conducted Output Power (802.11g-CH 11) 9Mbps



Conducted Output Power (802.11g-CH 11) 12Mbps



Conducted Output Power (802.11g-CH 11) 18Mbps



Conducted Output Power (802.11g-CH 11) 24Mbps



Conducted Output Power (802.11g-CH 11) 36Mbps



Conducted Output Power (802.11g-CH 11) 48Mbps



Conducted Output Power (802.11g-CH 11) 54Mbps



Conducted Output Power (802.11n-CH 1) 6.5Mbps



Conducted Output Power (802.11n-CH 1) 13Mbps



Conducted Output Power (802.11n-CH 1) 19.5Mbps



Conducted Output Power (802.11n-CH 1) 26Mbps



Conducted Output Power (802.11n-CH 1) 39Mbps



Conducted Output Power (802.11n-CH 1) 52Mbps



Conducted Output Power (802.11n-CH 1) 58.5Mbps



Conducted Output Power (802.11n-CH 1) 65Mbps



Conducted Output Power (802.11n-CH 6) 6.5Mbps



Conducted Output Power (802.11n-CH 6) 13Mbps



Conducted Output Power (802.11n-CH 6) 19.5Mbps



Conducted Output Power (802.11n-CH 6) 26Mbps



Conducted Output Power (802.11n-CH 6) 39Mbps



Conducted Output Power (802.11n-CH 6) 52Mbps



Conducted Output Power (802.11n-CH 6) 58.5Mbps



Conducted Output Power (802.11n-CH 6) 65Mbps



Conducted Output Power (802.11n-CH 11) 6.5Mbps



Conducted Output Power (802.11n-CH 11) 13Mbps



Conducted Output Power (802.11n-CH 11) 19.5Mbps



Conducted Output Power (802.11n-CH 11) 26Mbps



Conducted Output Power (802.11n-CH 11) 39Mbps



Conducted Output Power (802.11n-CH 11) 52Mbps



Conducted Output Power (802.11n-CH 11) 58.5Mbps



Conducted Output Power (802.11n-CH 11) 65Mbps



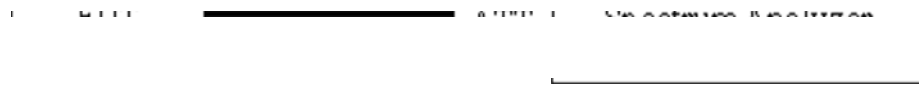
8.3 POWER SPECTRAL DENSITY (802.11b/g/n)

Test Requirements and limit, §15.247(e)

The peak power spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

■ TEST CONFIGURATION



■ TEST PROCEDURE

We tested according to ANSI 63.10 (issued 2009).

The spectrum analyzer is set to :

Span = 20 MHz(For devices with a nominal 40 MHz BW, 50 MHz span will be needed)

Reference level = 20 dBm

Attenuation = 0 dB (add internal attenuation, if necessary)

Sweep time = Auto Coupled

RBW = 3 kHz

VBW = 10 kHz

Detector = Peak

MKR = Center Frequency

Trace = Clear write

Set the TRACE to MAX HOLD, and after the trace stabilizes, the TRACE to VIEW.

SET the marker on the peak of the signal and then adjust the center frequency of the spectrum analyzer to the marker frequency.

After viewing the EUT waveform on the spectrum analyzer, perform the following spectrum analyzer functions to capture the trace

Span = 300 kHz

Sweep time = 100 s

Trace = Max hold

MKR = Peak Search

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

■ Sample Calculation

$$\begin{aligned}\text{PSD} &= \text{Reading Value} + \text{ATT loss} + \text{Cable loss}(1 \text{ ea}) \\ &= -5 \text{ dBm} + 10 \text{ dB} + 0.8 \text{ dB} = 5.8 \text{ dBm}\end{aligned}$$

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

So, 10.1 dB is offset. And the offset gap in the 2.4 GHz range do not affect the power spectral density final result.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.11
	2437	10.10
	2462	10.12

(Actual value of loss for the attenuator and cable combination)

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1	802.11b	-6.642	8	Pass
2437	6		-5.704	8	Pass
2462	11		-6.117	8	Pass
2412	1	802.11g	-12.471	8	Pass
2437	6		-12.025	8	Pass
2462	11		-12.691	8	Pass
2412	1	802.11n	-14.508	8	Pass
2437	6		-14.367	8	Pass
2462	11		-12.949	8	Pass

■ RESULT PLOTS

Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11b-CH 6)



Power Spectral Density (802.11b-CH 11)



Power Spectral Density (802.11g-CH 1)



Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11g-CH11)



Power Spectral Density (802.11n-CH 1)



Power Spectral Density (802.11n-CH 6)



Power Spectral Density (802.11n-CH11)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

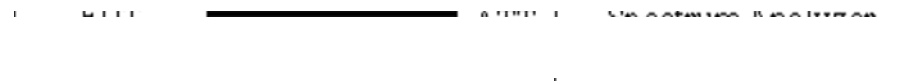
8.4 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit : 20 dBc

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. (Procedure 7.7.10 in ANSI 63.10)

RBW = 100 kHz (Upon 1 GHz = 1 MHz)

VBW = 300 kHz (Upon 1 GHz = 1 MHz)

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep = auto couple

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The band edge results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

So, 10.1 dB is offset. And the offset gap in the 2.4 GHz range do not affect the band edge final result.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898	

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.11
	2437	10.10
	2462	10.12

(Actual value of loss for the attenuator and cable combination)

5. In case of conducted spurious emissions test, please check factors blow table.

■ FACTORS FOR FREQUENCY

Freq(MHz)	Factor(dB)
30	10.37
100	10.16
200	10.15
300	10.14
400	10.18
500	10.19
600	10.20
700	10.30
800	10.25
900	10.28
1000	10.29
2000	10.17
2412*	10.11
2437*	10.10
2462*	10.12
3000	10.26
4000	10.31
5000	9.85
6000	10.20
7000	10.60
8000	10.53
9000	10.23
10000	10.41
11000	10.65
12000	11.19
13000	10.97
14000	11.42
15000	12.01
16000	11.77
17000	10.78
18000	10.76
19000	11.15
20000	10.75
21000	10.82
22000	10.82
23000	11.26
24000	11.08
25000	11.18
26000	10.90

Note : 1. '*' is fundamental frequency range.

2. Factor = Cable loss + Attenuator loss

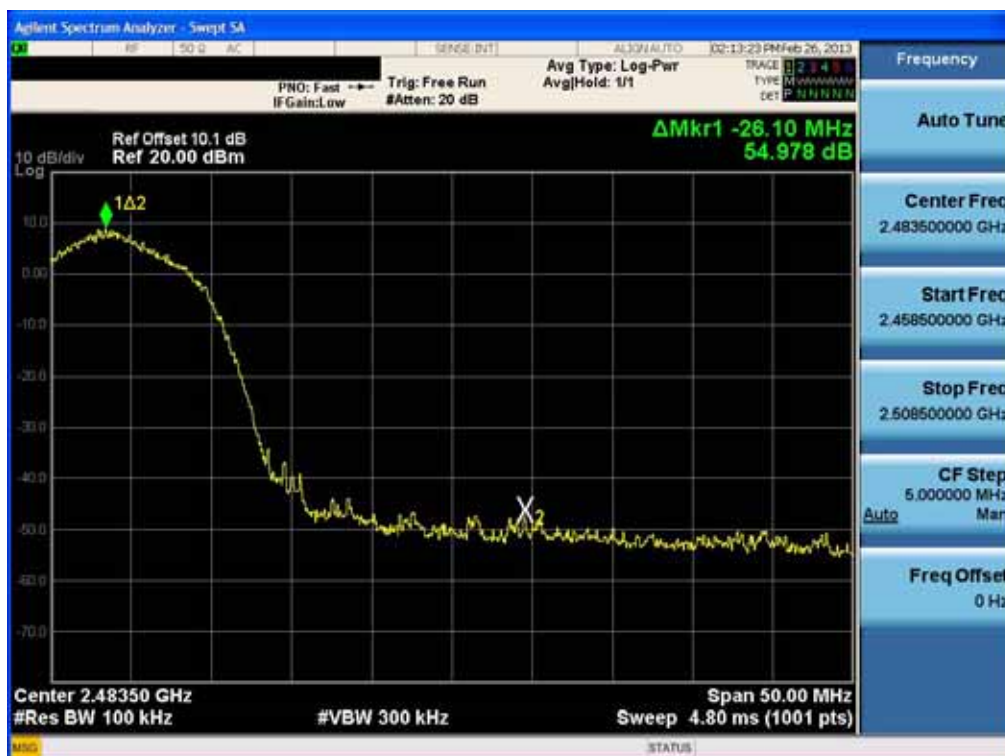
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

RESULT PLOTS

BandEdge (802.11b-CH1)



BandEdge (802.11b-CH11)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz		FCC ID: A3LGTS7898

BandEdge (802.11g-CH1)



BandEdge (802.11g-CH11)



BandEdge (802.11n-CH1)

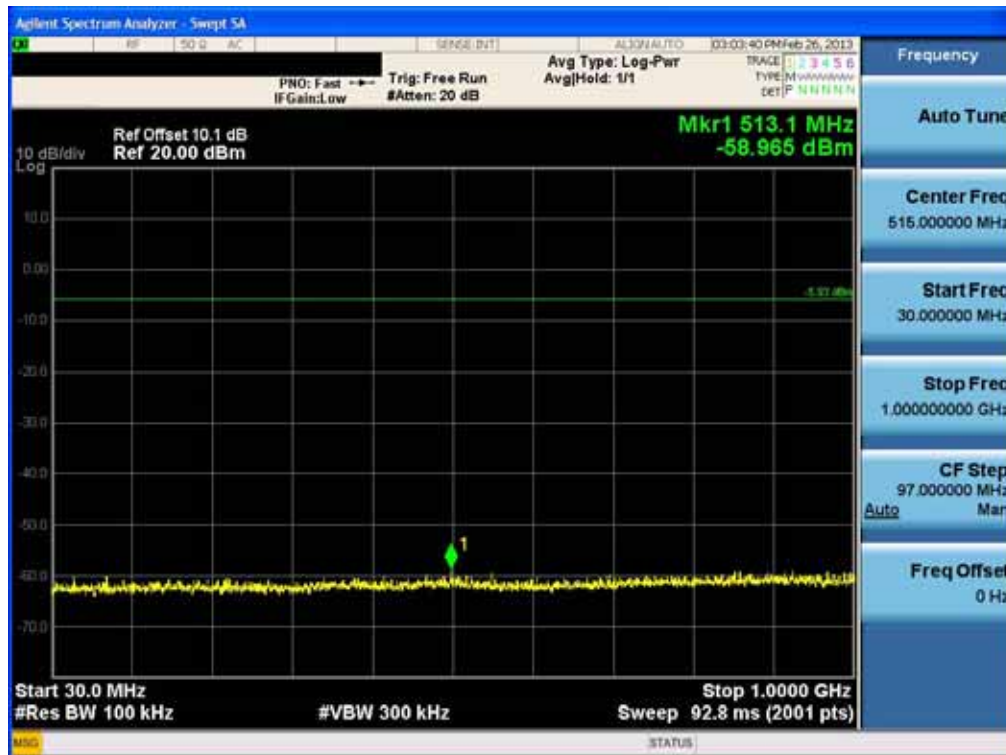


BandEdge (802.11n-CH11)

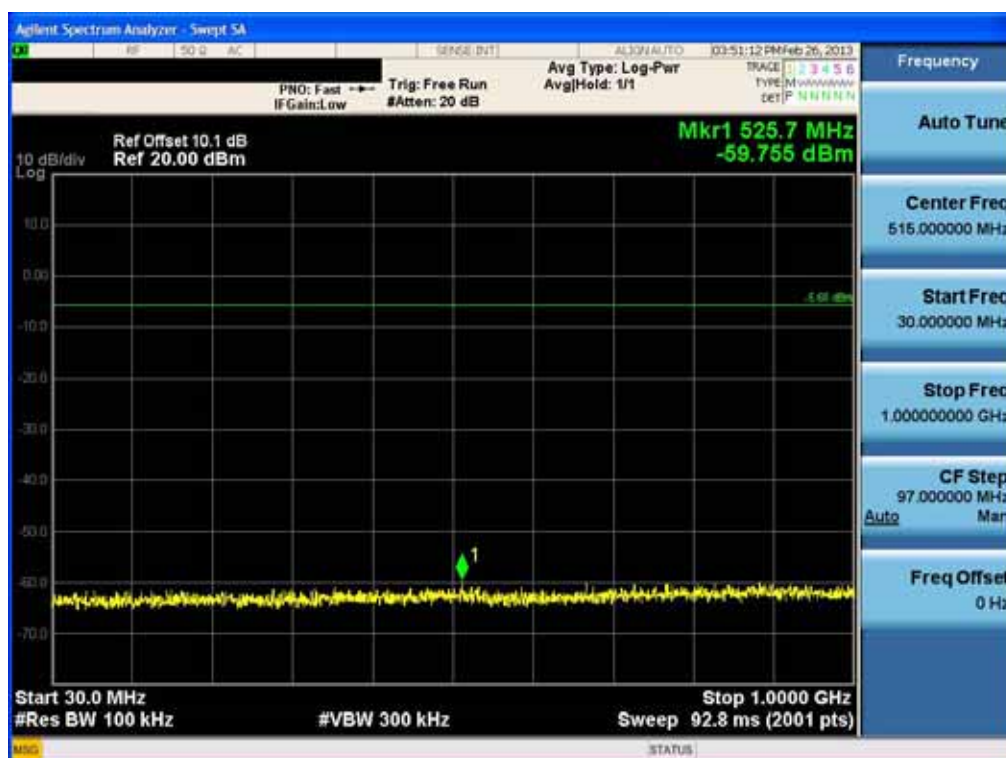


30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b-CH1)

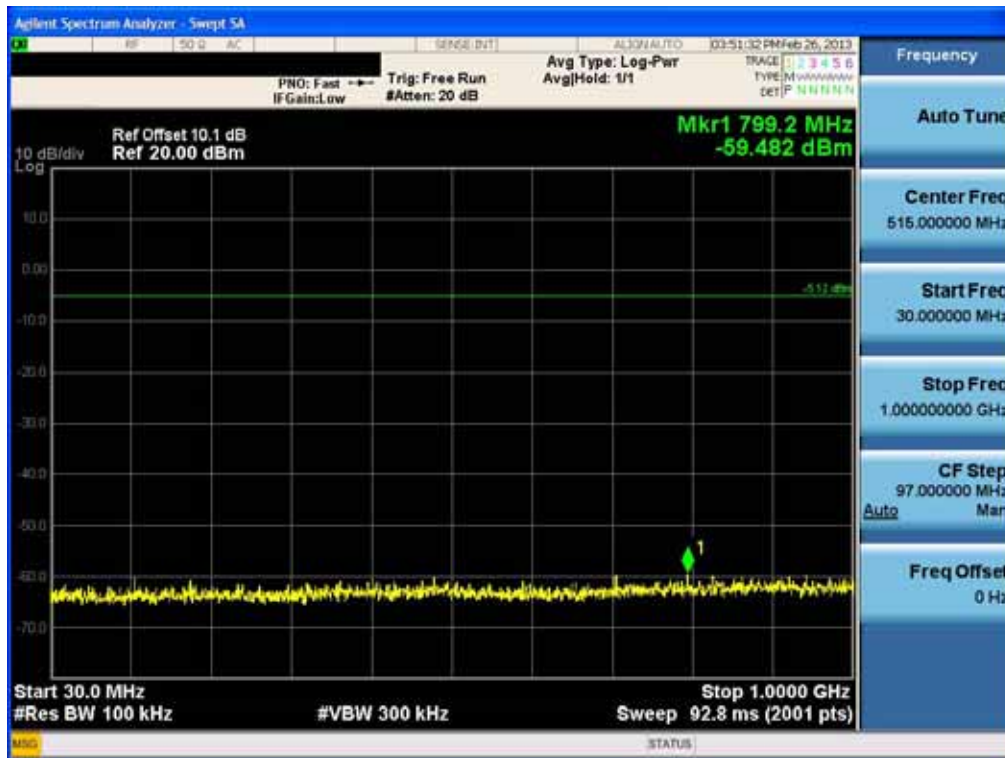


Conducted Spurious Emission (802.11b-CH6)

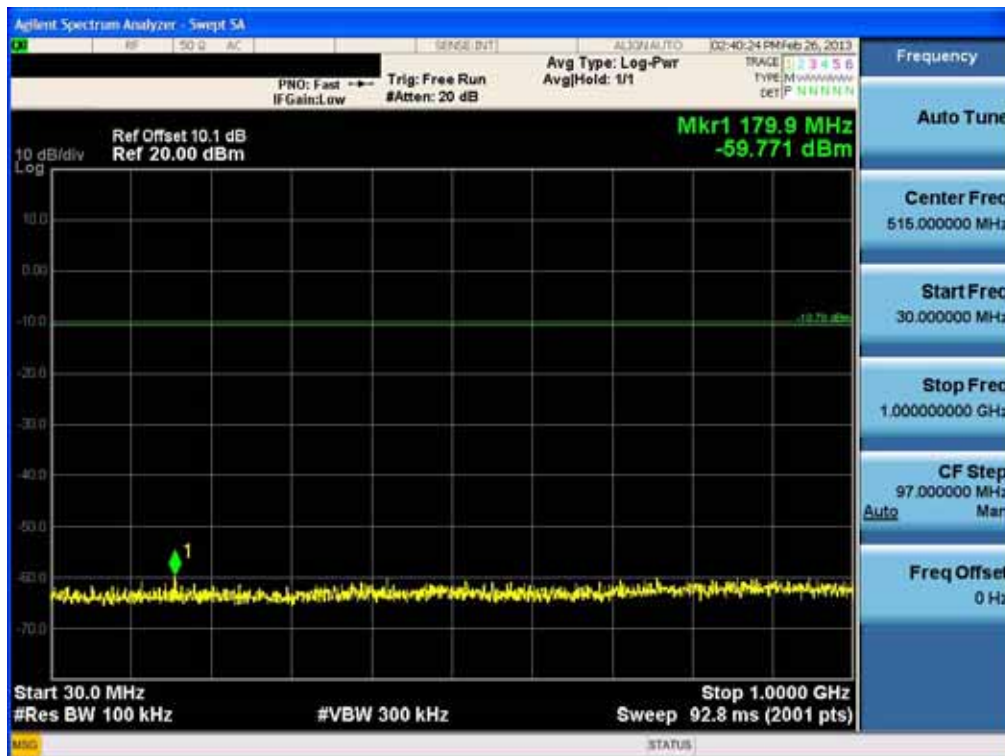


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Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

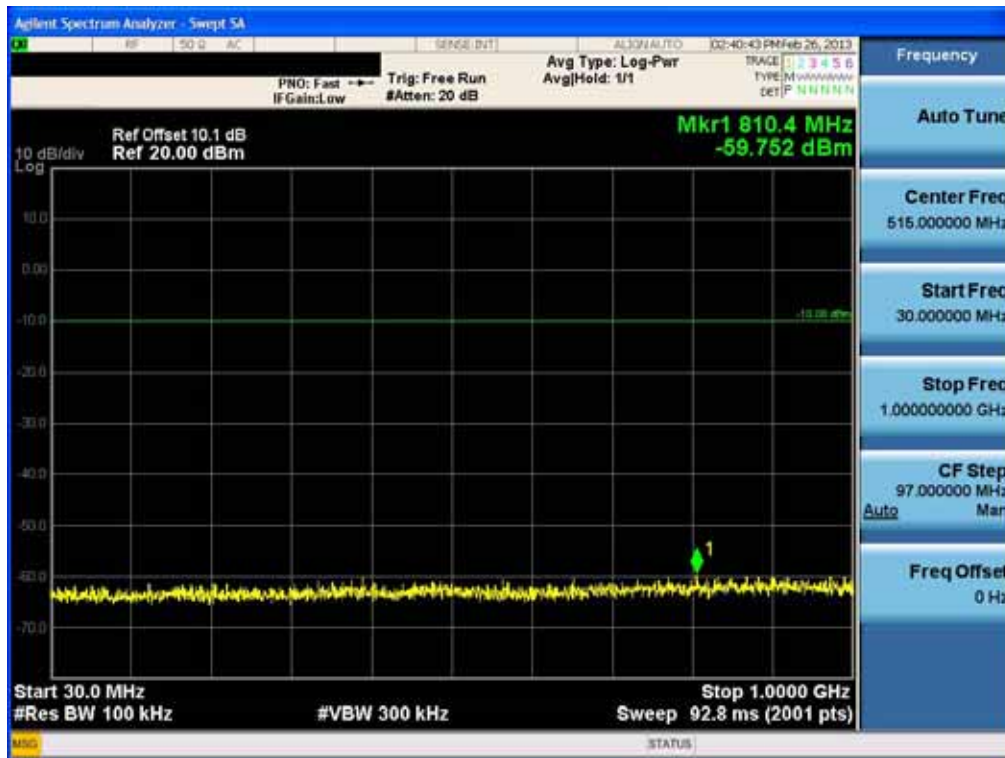
Conducted Spurious Emission (802.11b-CH11)



Conducted Spurious Emission (802.11g-CH1)



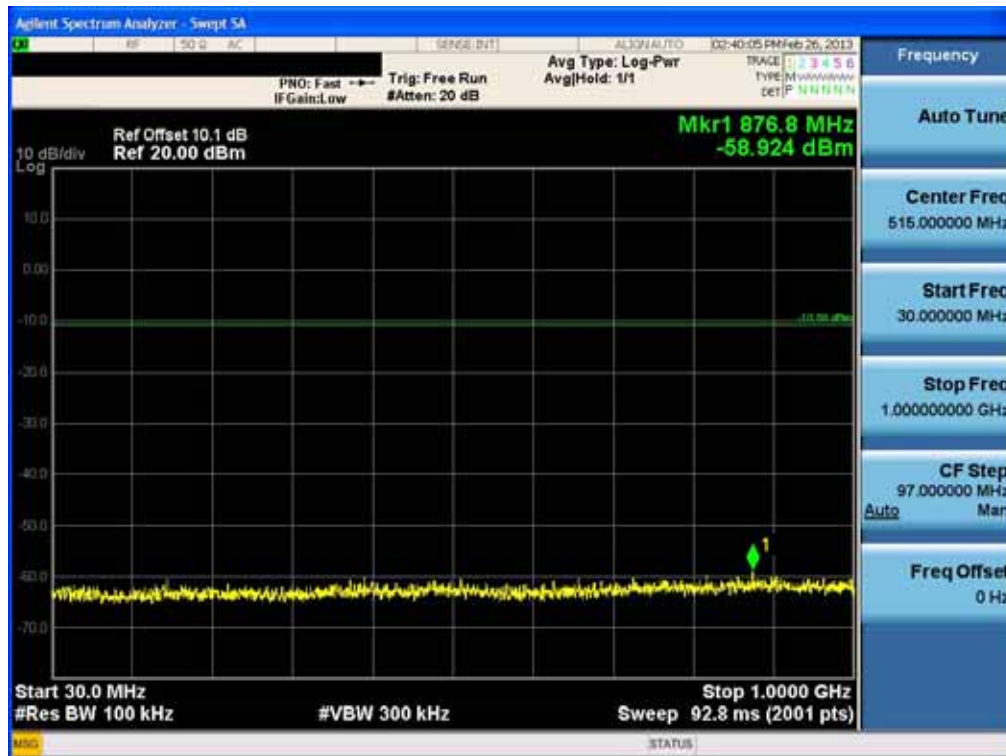
Conducted Spurious Emission (802.11g-CH6)



Conducted Spurious Emission (802.11g-CH11)



Conducted Spurious Emission (802.11n-CH1)



Conducted Spurious Emission (802.11n-CH6)



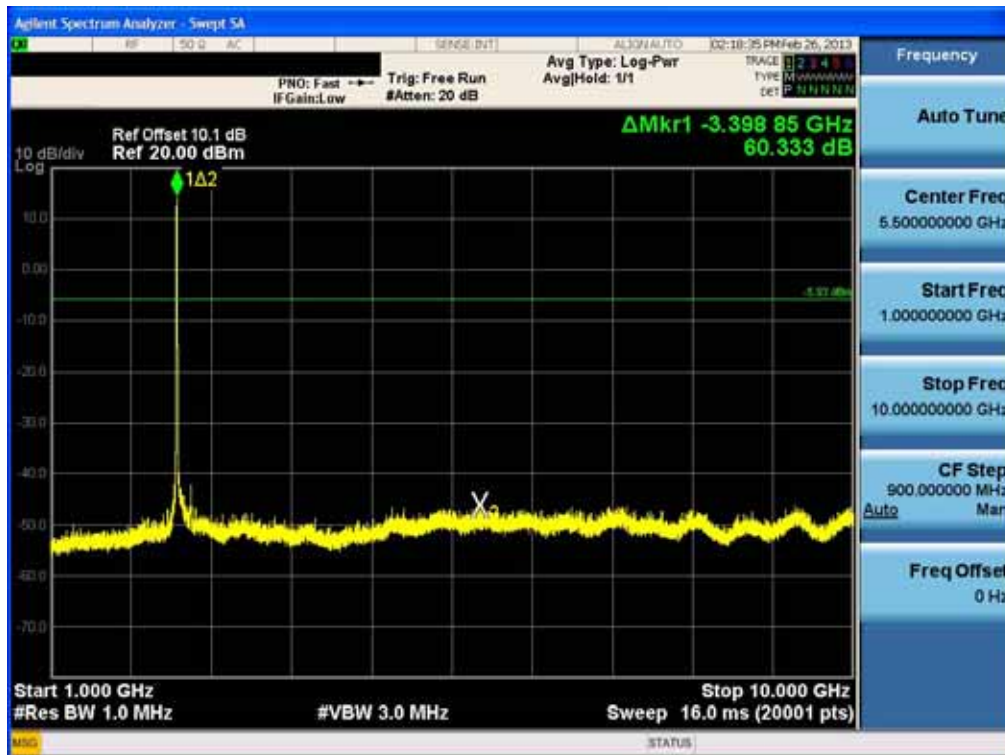
Conducted Spurious Emission (802.11n-CH11)



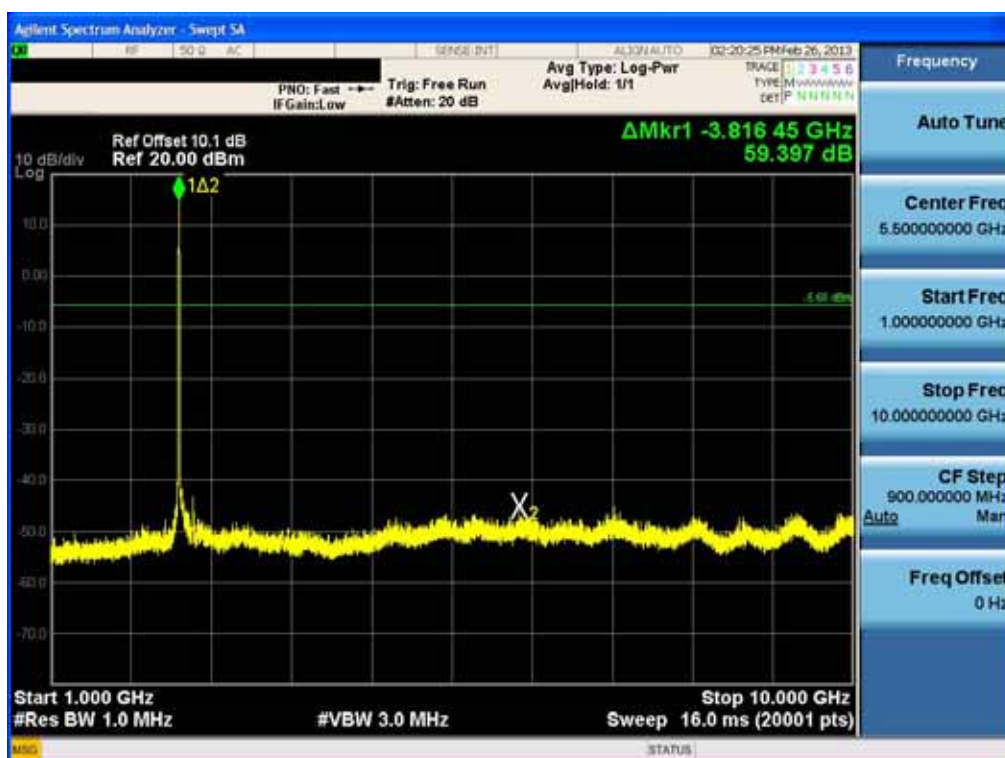
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Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

1 GHz ~ 10 GHz

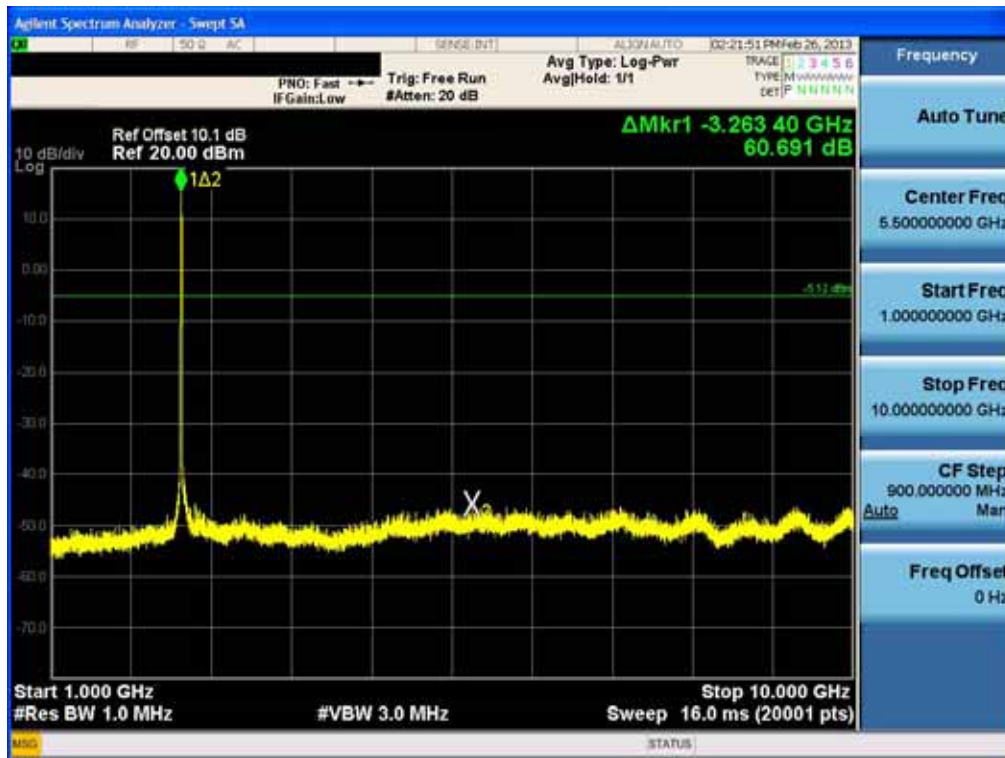
Conducted Spurious Emission (802.11b-CH1)



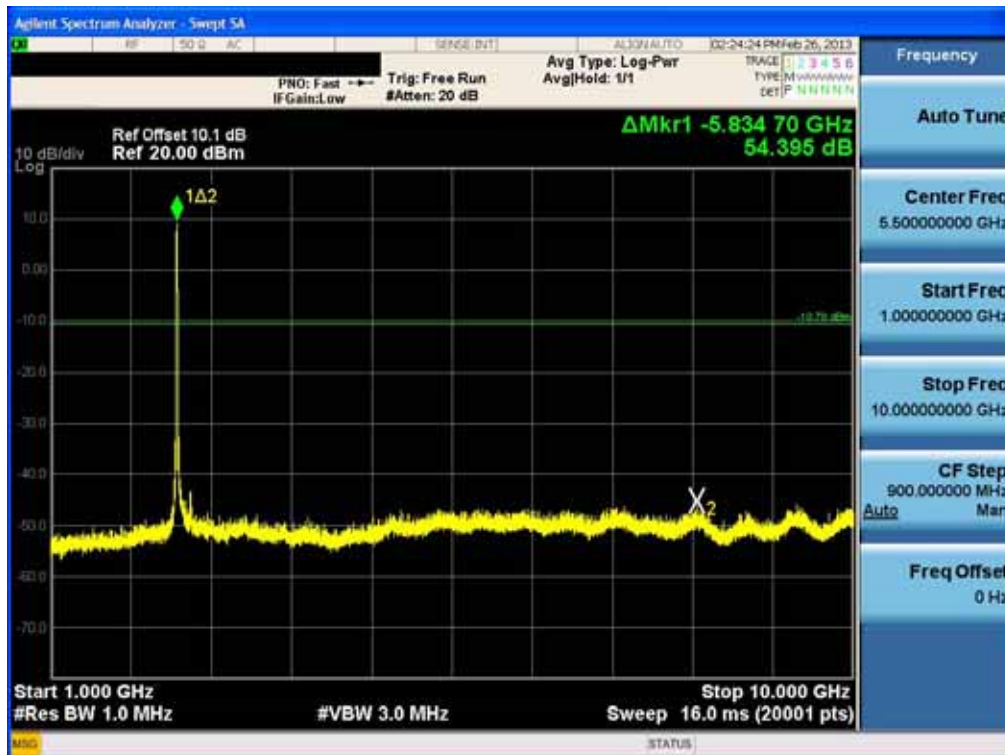
Conducted Spurious Emission (802.11b-CH6)



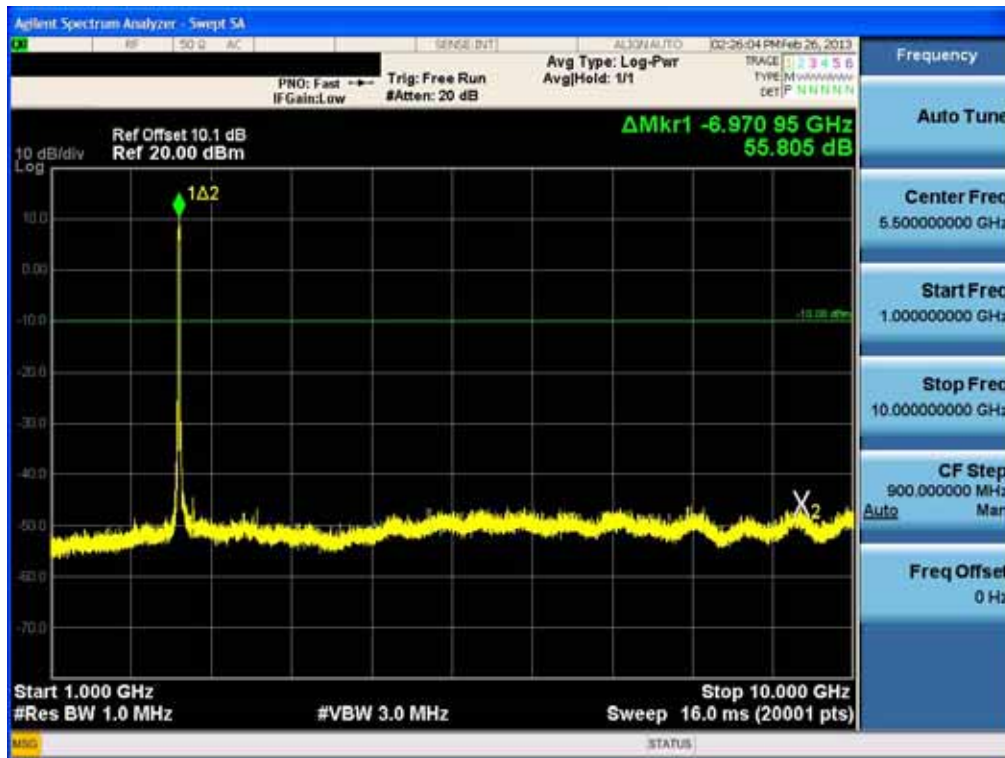
Conducted Spurious Emission (802.11b-CH11)



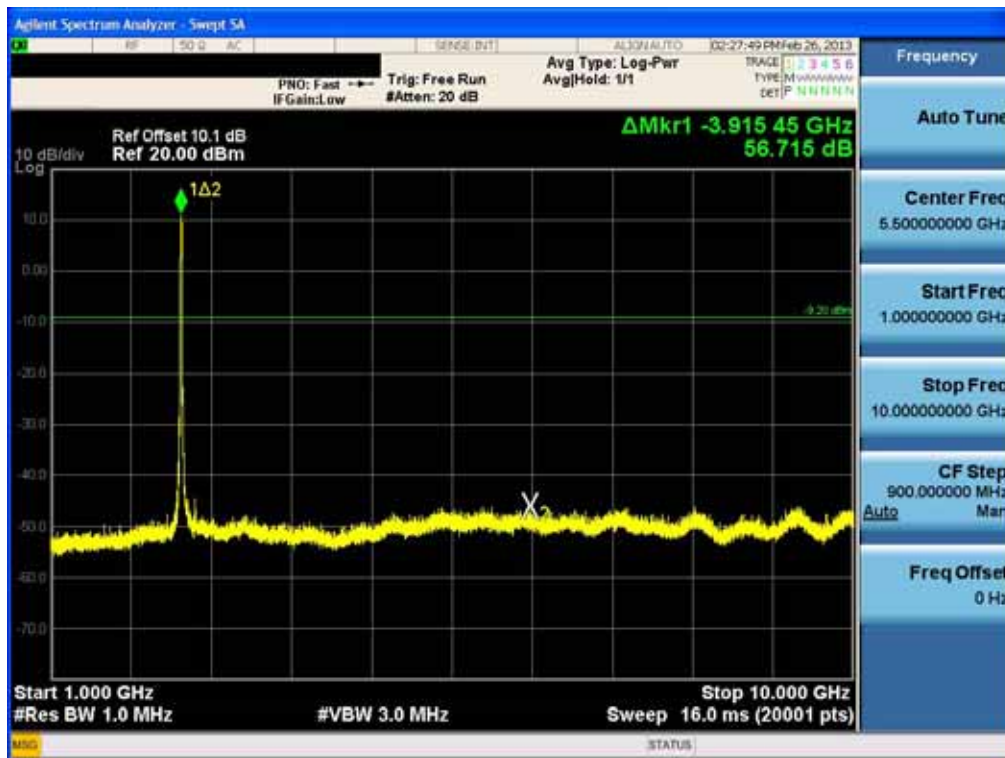
Conducted Spurious Emission (802.11g-CH1)



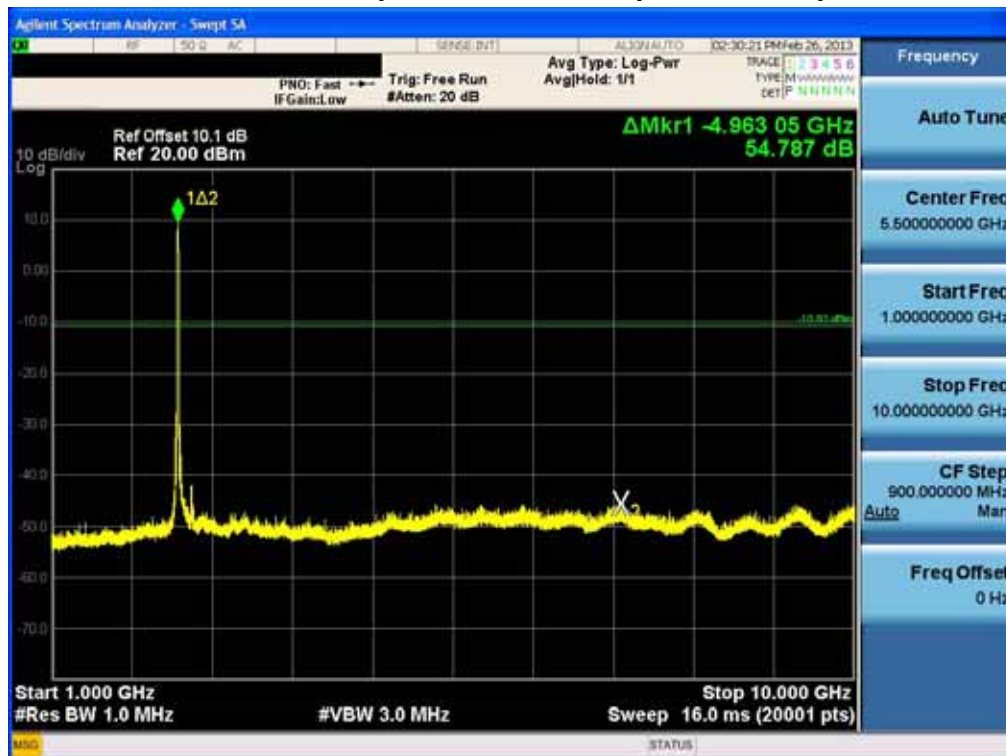
Conducted Spurious Emission (802.11g-CH6)



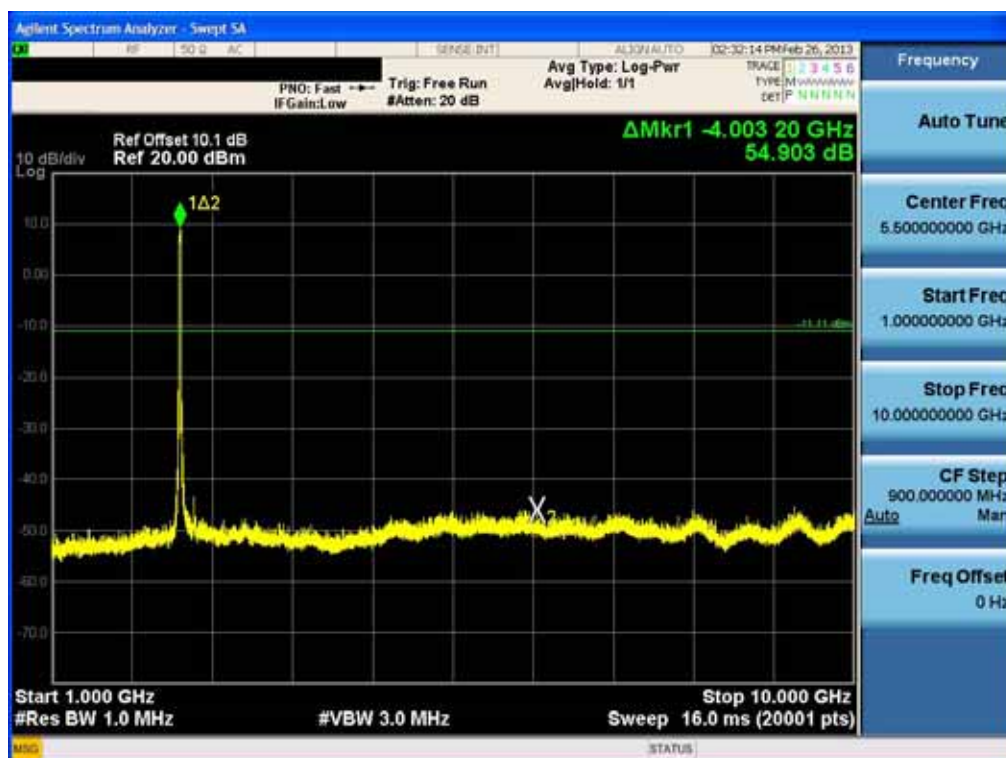
Conducted Spurious Emission (802.11g-CH11)



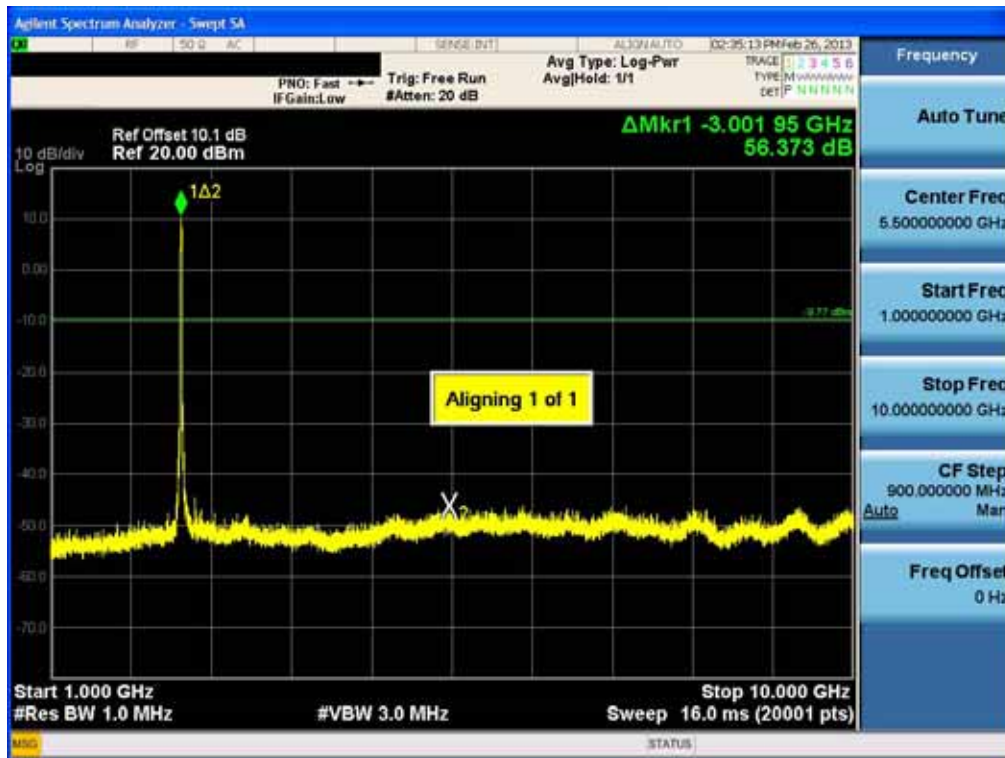
Conducted Spurious Emission (802.11n-CH1)



Conducted Spurious Emission (802.11n-CH6)



Conducted Spurious Emission (802.11n-CH11)



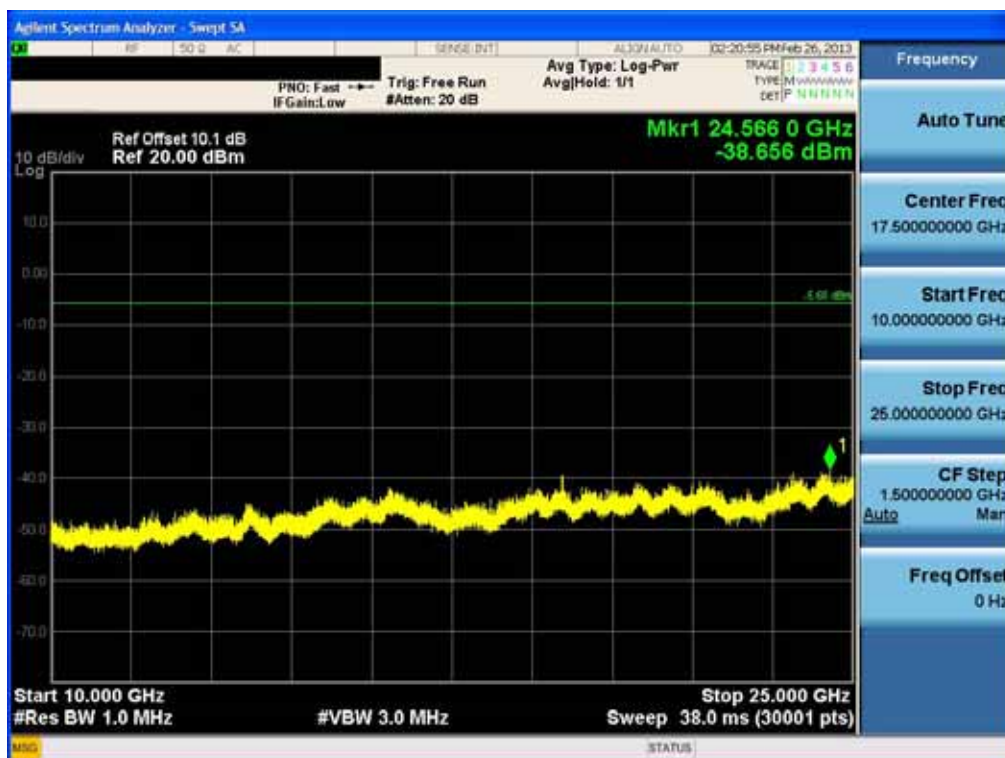
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

10 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b-CH1)



Conducted Spurious Emission (802.11b-CH6)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz		FCC ID: A3LGTS7898

Conducted Spurious Emission (802.11b-CH11)



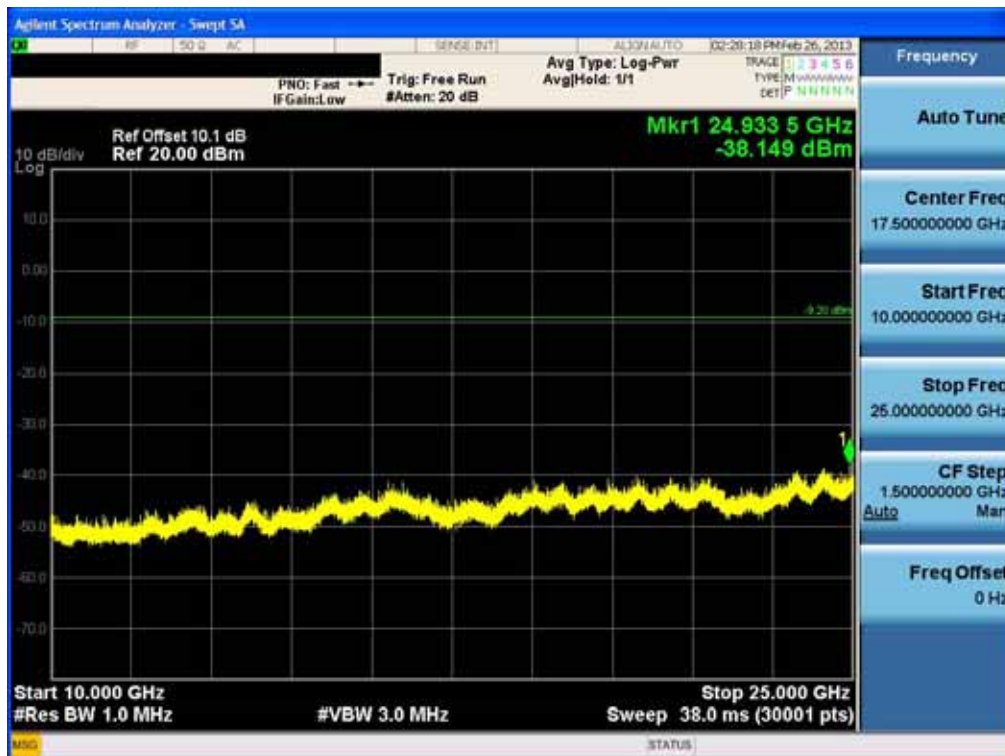
Conducted Spurious Emission (802.11g-CH1)



Conducted Spurious Emission (802.11g-CH6)



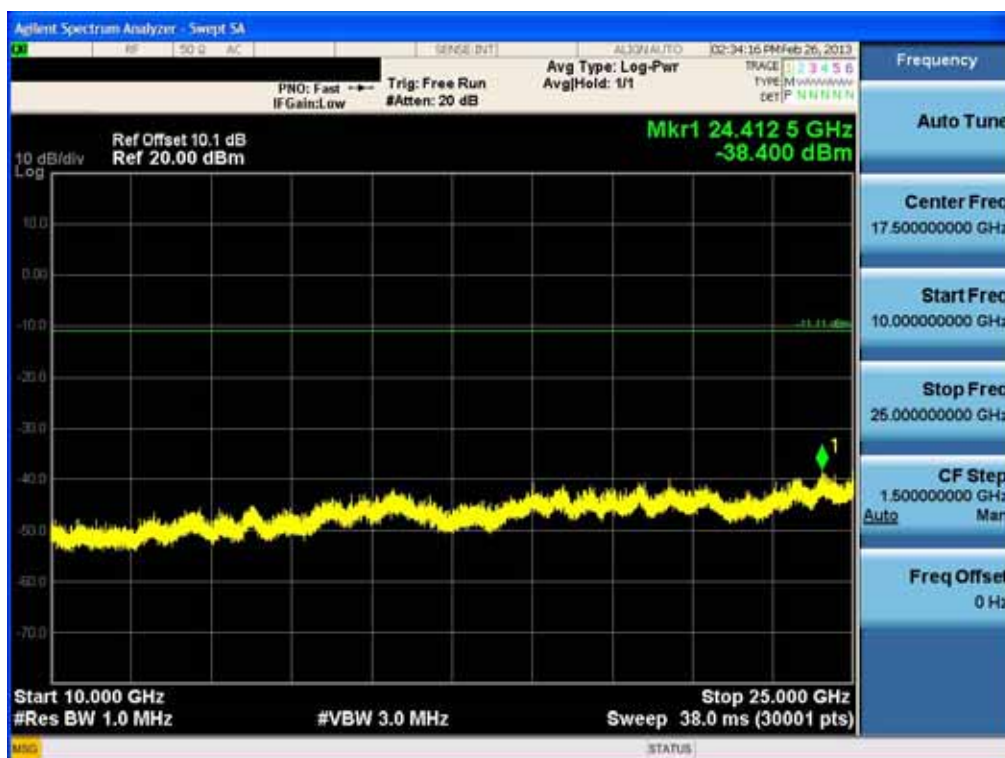
Conducted Spurious Emission (802.11g-CH11)



Conducted Spurious Emission (802.11n-CH1)



Conducted Spurious Emission (802.11n-CH6)



Conducted Spurious Emission (802.11n-CH11)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

8.5 RADIATED MEASUREMENT.

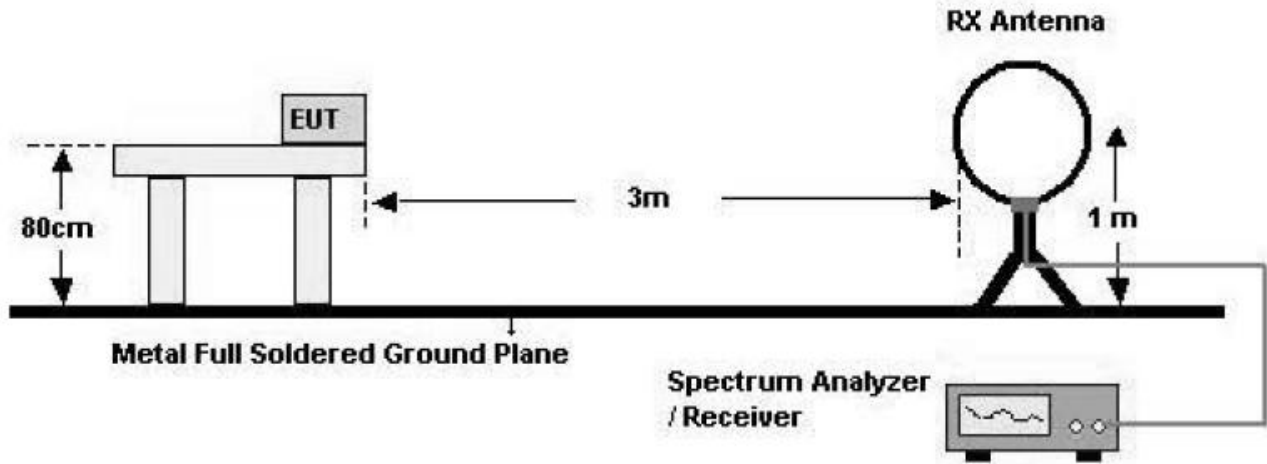
8.5.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

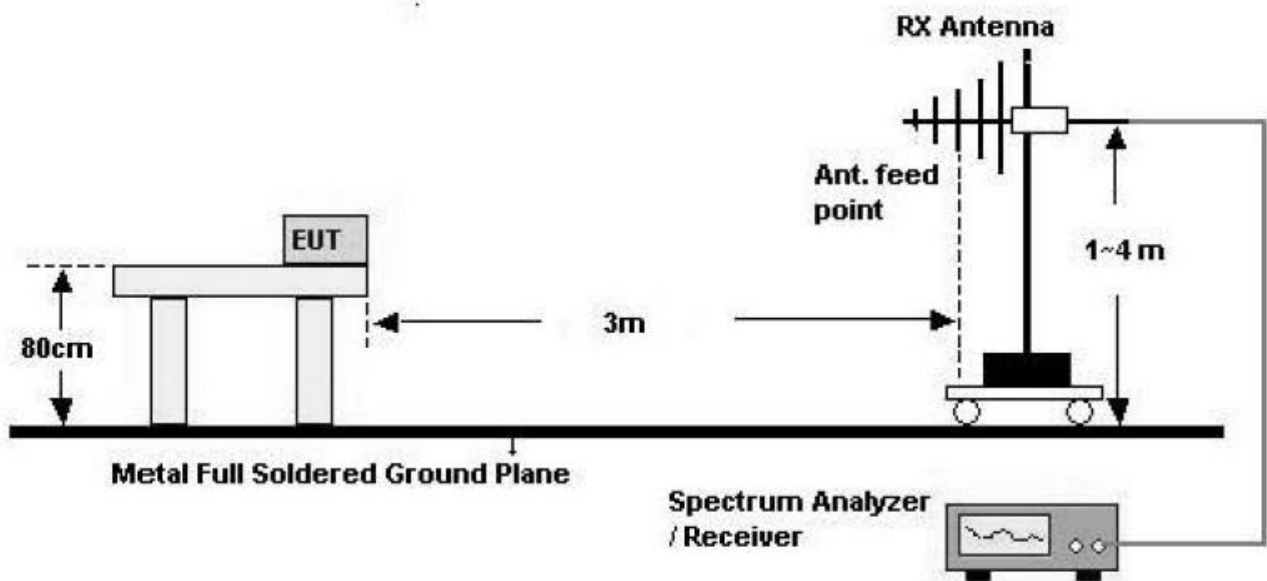
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

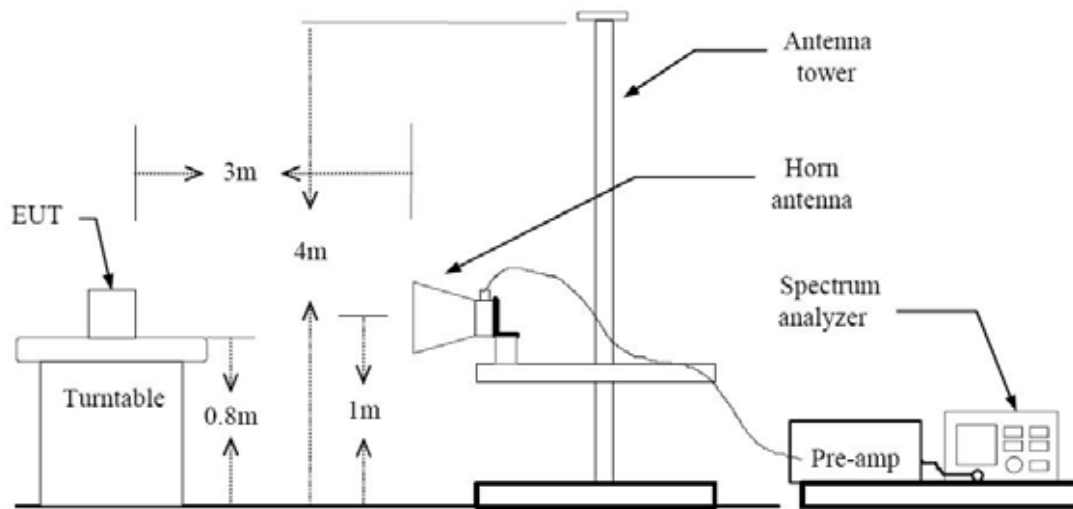
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	51.01	-0.79	V	50.22	74	23.78	PK
4824	38.18	-0.79	V	37.39	54	16.61	AV
7236	48.92	9.08	V	58	74	16.00	PK
7236	35.88	9.08	V	44.96	54	9.04	AV
4824	49.81	-0.79	H	49.02	74	24.98	PK
4824	37.16	-0.79	H	36.37	54	17.63	AV
7236	49.40	9.08	H	58.48	74	15.52	PK
7236	35.84	9.08	H	44.92	54	9.08	AV

Operation Mode:	802.11 g
Transfer Rate:	6 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	49.78	-0.79	V	48.99	74	25.01	PK
4824	37.15	-0.79	V	36.36	54	17.64	AV
7236	48.75	9.08	V	57.83	74	16.17	PK
7236	35.84	9.08	V	44.92	54	9.08	AV
4824	49.97	-0.79	H	49.18	74	24.82	PK
4824	37.21	-0.79	H	36.42	54	17.58	AV
7236	48.81	9.08	H	57.89	74	16.11	PK
7236	35.86	9.08	H	44.94	54	9.06	AV

Operation Mode: 802.11 n

Transfer Rate: 6.5 Mbps

Operating Frequency: 2412

Channel No. 01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	50.04	-0.79	V	49.25	74	24.75	PK
4824	37.23	-0.79	V	36.44	54	17.56	AV
7236	48.85	9.08	V	57.93	74	16.07	PK
7236	35.89	9.08	V	44.97	54	9.03	AV
4824	50.23	-0.79	H	49.44	74	24.56	PK
4824	37.31	-0.79	H	36.52	54	17.48	AV
7236	48.99	9.08	H	58.07	74	15.93	PK
7236	35.88	9.08	H	44.96	54	9.04	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak (Procedure 4.2.3.2.2 in ANSI 63.10)
 - RBW = 1 MHz
 - VBW = 3 MHz
 - Detector = Peak
 - Trace = Max hold
 - Sweep = auto couple
 - b. Average (Procedure 4.2.3.2.3 in ANSI 63.10)
 - RBW = 1 MHz
 - VBW = 10 Hz
 - Span = Zero
 - Detector Mode = Peak



Trace = Max hold

We performed using a reduced video BW method was done with the analyzer in linear mode.

6. We have done 802.11b/g/n mode test. Worst case of EUT is 1 Mbps in 802.11b.

7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

Operation Mode: 802.11 b

Transfer Rate: 1 Mbps

Operating Frequency: 2437

Channel No.: 06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	51.06	-0.37	V	50.69	74	23.31	PK
4874	37.83	-0.37	V	37.46	54	16.54	AV
7311	48.62	8.64	V	57.26	74	16.74	PK
7311	35.04	8.64	V	43.68	54	10.32	AV
4874	50.48	-0.37	H	50.11	74	23.89	PK
4874	36.60	-0.37	H	36.23	54	17.77	AV
7311	48.85	8.64	H	57.49	74	16.51	PK
7311	35.58	8.64	H	44.22	54	9.78	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak (Procedure 4.2.3.2.2 in ANSI 63.10)
 - RBW = 1 MHz
 - VBW = 3 MHz
 - Detector = Peak
 - Trace = Max hold
 - Sweep = auto couple
 - b. Average (Procedure 4.2.3.2.3 in ANSI 63.10)
 - RBW = 1 MHz
 - VBW = 10 Hz
 - Span = Zero
 - Detector Mode = Peak



Trace = Max hold

We performed using a reduced video BW method was done with the analyzer in linear mode.

6. We have done 802.11b/g/n mode test. Worst case of EUT is 1 Mbps in 802.11b.

7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

Operation Mode: 802.11 b

Transfer Rate: 1 Mbps

Operating Frequency: 2462

Channel No. 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	50.37	-0.15	V	50.22	74	23.78	PK
4924	37.30	-0.15	V	37.15	54	16.85	AV
7386	49.03	9.06	V	58.09	74	15.91	PK
7386	35.57	9.06	V	44.63	54	9.37	AV
4924	49.56	-0.15	H	49.41	74	24.59	PK
4924	36.27	-0.15	H	36.12	54	17.88	AV
7386	49.39	9.06	H	58.45	74	15.55	PK
7386	35.55	9.06	H	44.61	54	9.39	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak (Procedure 4.2.3.2.2 in ANSI 63.10)
 - RBW = 1 MHz
 - VBW = 3 MHz
 - Detector = Peak
 - Trace = Max hold
 - Sweep = auto couple
 - b. Average (Procedure 4.2.3.2.3 in ANSI 63.10)
 - RBW = 1 MHz
 - VBW = 10 Hz
 - Span = Zero
 - Detector Mode = Peak



Trace = Max hold

We performed using a reduced video BW method was done with the analyzer in linear mode.

6. We have done 802.11b/g/n mode test. Worst case of EUT is 1 Mbps in 802.11b.

7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz	FCC ID: A3LGTS7898

8.5.2 RADIATED RESTRICTED BAND EDGES

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	34.09	33.90	H	67.99	74	6.01	PK
2390.0	16.07	33.90	H	49.97	54	4.03	AV
2390.0	31.43	33.90	V	65.33	74	8.67	PK
2390.0	14.37	33.90	V	48.27	54	5.73	AV
2483.5	34.31	33.99	H	68.30	74	5.70	PK
2483.5	14.62	33.99	H	48.61	54	5.39	AV
2483.5	32.02	33.99	V	66.01	74	7.99	PK
2483.5	13.59	33.99	V	47.58	54	6.42	AV

Operation Mode: 802.11b
 Transfer Rate: 1 Mbps
 Operating Frequency: 2412 MHz, 2462 MHz
 Channel No. 01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390	24.31	33.90	H	58.21	74	15.79	PK
2390	11.49	33.90	H	45.39	54	8.61	AV
2390	24.25	33.90	V	58.15	74	15.85	PK
2390	11.51	33.90	V	45.41	54	8.59	AV
2483.5	24.03	33.99	H	58.02	74	15.98	PK
2483.5	11.48	33.99	H	45.47	54	8.53	AV
2483.5	23.98	33.99	V	57.97	74	16.03	PK
2483.5	11.47	33.99	V	45.46	54	8.54	AV

Operation Mode: 802.11n
 Transfer Rate: 6.5 Mbps
 Operating Frequency: 2412 MHz, 2462 MHz
 Channel No. 01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.00	33.28	33.90	H	67.18	74	6.82	PK
2390.00	15.35	33.90	H	49.25	54	4.75	AV
2390.00	30.21	33.90	V	64.11	74	9.89	PK
2390.00	13.54	33.90	V	47.44	54	6.56	AV
2483.50	33.64	33.99	H	67.63	74	6.37	PK
2483.50	13.78	33.99	H	47.77	54	6.23	AV
2483.50	31.27	33.99	V	65.26	74	8.74	PK
2483.50	12.69	33.99	V	46.68	54	7.32	AV

Notes:

- Total = Reading Value + Antenna Factor + Cable Loss
 - Spectrum setting:
 - Peak (Procedure 4.2.3.2.2 in ANSI 63.10)
- RBW = 1 MHz
 VBW = 3 MHz



Detector = Peak

Trace = Max hold

Sweep = auto couple

b. Average (Procedure 4.2.3.2.3 in ANSI 63.10)

RBW = 1 MHz

VBW = 10 Hz

Span = Zero

Detector Mode = Peak

Trace = Max hold

We performed using a reduced video BW method was done with the analyzer in linear mode.

3. We have done 802.11b/g/n mode test. . Worst case of EUT is 6 Mbps in 802.11g.

4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1303FR07-1	Date of Issue: March 20, 2013	EUT Type: 1900 GSM/GPRS/EDGE Phone with Bluetooth v3.0 and WLAN 2.4GHz		FCC ID: A3LGTS7898

8.6 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. We are performed the AC Power Line Conducted Emission test for 11 Mbps, Ch.11 and 802.11b. Because 802.11b mode is worst case.

RESULT PLOTS

Conducted Emissions (Line 1)

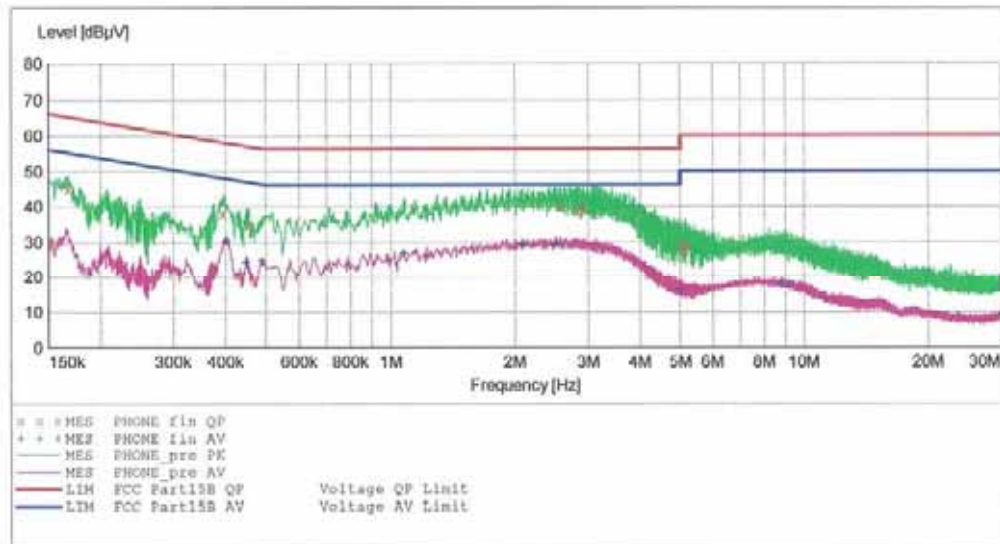
HCT

EMC

EUT: GT-S7898
 Manufacturer: SAMSUNG
 Operating Condition: WLAN MODE
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART 15 B
 Comment: H

SCAN TABLE: "FCC PART 15 B(H)"

Short Description:			FCC PART 15 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	1.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin QP"

2/26/2013 9:44AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.167010	45.20	9.7	65	19.9	---	---
0.394010	38.20	9.8	58	19.8	---	---
0.455010	34.80	9.8	57	21.9	---	---
2.560000	40.00	10.0	56	16.0	---	---
2.828000	38.60	10.0	56	17.4	---	---
2.928000	39.60	10.0	56	16.4	---	---
5.028000	29.20	10.2	60	30.8	---	---
5.144000	27.50	10.2	60	32.5	---	---
5.180000	28.80	10.2	60	31.2	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2/26/2013 9:44AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.402010	30.40	9.8	48	17.4	---	---
0.447010	24.10	9.8	47	22.9	---	---
0.490010	24.60	9.8	46	21.6	---	---
1.076000	26.80	9.8	46	19.2	---	---
2.088000	29.30	9.9	46	16.7	---	---
2.512000	29.40	10.0	46	16.6	---	---
5.000000	16.00	10.2	46	30.0	---	---
8.800000	17.90	10.4	50	32.1	---	---
9.192000	17.60	10.4	50	32.4	---	---

Conducted Emissions (Line 2)

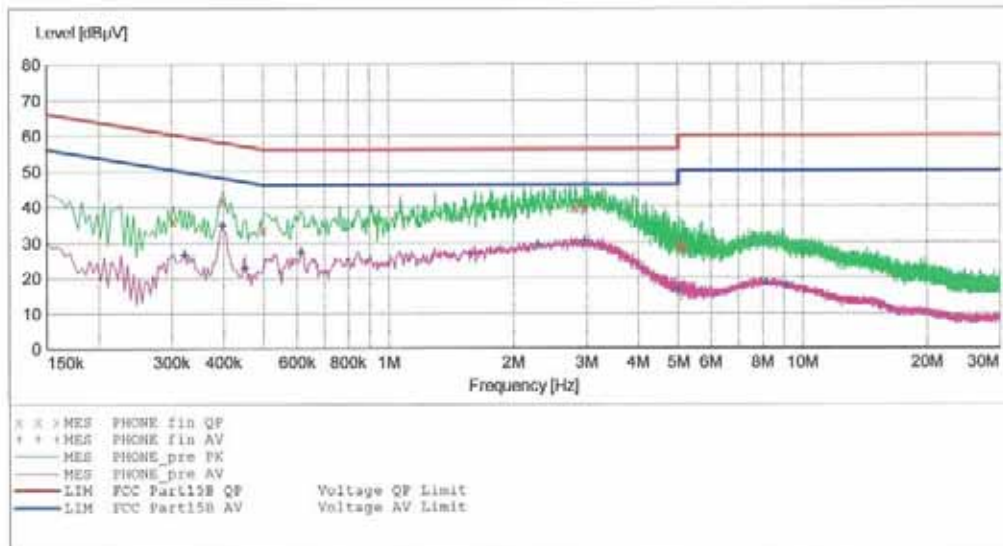
HCT

EMC

EUT: GT-57898
 Manufacturer: SAMSUNG
 Operating Condition: WLAN MODE
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART 15 CLASS B
 Comment: N

SCAN TABLE: "FCC PART 15 B(N)"

Short Description:			FCC PART 15 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin QP"

2/26/2013 9:49AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.302010	36.00	9.9	60	24.2	---	---
0.398010	41.80	10.0	58	16.1	---	---
0.498010	33.60	10.0	56	22.4	---	---
2.820000	39.60	10.2	56	16.4	---	---
2.968000	39.50	10.2	56	16.5	---	---
2.976000	39.50	10.2	56	16.5	---	---
5.028000	29.50	10.4	60	30.5	---	---
5.112000	28.60	10.4	60	31.4	---	---
5.184000	28.20	10.4	60	31.8	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2/26/2013 9:49AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.322010	26.50	9.9	50	23.2	---	---
0.398010	34.60	10.0	48	13.3	---	---
0.450010	22.70	10.0	47	24.2	---	---
0.616000	27.20	10.0	46	18.8	---	---
2.296000	29.30	10.2	46	16.7	---	---
2.976000	30.30	10.2	46	15.7	---	---
5.000000	16.80	10.4	46	29.2	---	---
8.180000	18.70	10.6	50	31.3	---	---
9.156000	17.80	10.6	50	32.2	---	---

9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	Annual	02/06/2014	100073
Schwarzbeck	VULB 9168/ TRILOG Antenna	Biennial	06/17/2013	255
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	05/03/2013	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	05/02/2013	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	07/31/2013	MY51110020
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/11/2013	10094
MITEQ	AMF-6B-180265-35-10P / POWER AMP	Annual	04/16/2013	667624
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2013	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	10/17/2013	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/09/2013	839117/011
Agilent	E4416A /Power Meter	Annual	11/07/2013	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	05/02/2013	MY4442009
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	05/02/2013	1
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	05/02/2013	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	05/02/2013	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	05/02/2013	1
Hewlett Packard	11636B/Power Divider	Annual	11/07/2013	11377
Hewlett Packard	11667B / Power Splitter	Annual	06/05/2013	05001
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	11/07/2013	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/07/2013	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	11/07/2013	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	05/02/2013	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/11/2014	9009-2536
MITEQ	AMF-6D-001180-35-20P/ POWER AMP	Annual	07/30/2013	990893
Agilent	8493C / Attenuator(10 dB)	Annual	07/30/2013	76649
WEINSCHL	2-3 / Attenuator(3 dB)	Annual	11/07/2013	BR0617
CERNEX	CBLU1183540 / POWER AMP	Annual	07/27/2013	21691