

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:

LG Electronics MobileComm U.S.A., Inc.

Address:

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue: June 20, 2014 Test Site/Location: HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majangmyeon, Icheon-si, Gyeonggi-do, Korea Report No.: HCT-R-1406-F042

HCT FRN: 0005866421

FCC ID	: ZNFD213F
APPLICANT	: LG Electronics MobileComm U.S.A., Inc.
FCC Model(s):	LG-D213f
Additional FCC Model(s):	LGD213f, D213f, LG-D213k, LGD213k, D213k, LG-D213cf, LGD213cf, D213cf
EUT Type:	GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP, Hotspot support
Max. RF Output Power:	Wi-Fi 802.11b(22.72 dBm) / Wi-Fi 802.11g (21.79 dBm) / Wi-Fi 802.11n_20 MHz (20.57 dBm) / Wi-Fi 802.11n_40 MHz (20.64 dBm)
Frequency Range:	2412 MHz - 2462 MHz (2.4 GHz Band)
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 : Kyoung Houn Seo **Test Engineer of RF Team**

Approved by : Chang Seok Choi Manager of RF Team

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Co., Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1406-F042	June 20, 2014	- First Approval Report

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EUT Type:	GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP, Hotspot
	support
Model name(s):	LG-D213f
Additional Model name(s):	LGD213f, D213f, LG-D213k, LGD213k, D213k, LG-D213cf, LGD213cf, D213cf
Date(s) of Tests:	May 28, 2014 ~ June 17, 2014
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
	(IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	GSM/WCI	GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP, Hotspot		
	support			
FCC Model Name	LG-D213f			
Additional FCC Model Name	LGD213f,	LGD213f, D213f, LG-D213k, LGD213k, D213k, LG-D213cf, LGD213cf, D213cf		
Power Supply	DC 3.8 V	DC 3.8 V		
Battery type	Li-ion Batt	Li-ion Battery(Standard)		
Frequency Range	TX: 2412 MHz ~ 2462 MHz, 2422 MHz - 2452 MHz_40 MHz BW			
	RX: 2412 MHz ~ 2462 MHz, 2422 MHz - 2452 MHz_40 MHz BW			
Max. RF Output Power	Peak	Wi-Fi 802.11b(22.72 dBm) / Wi-Fi 802.11g (21.79 dBm) / Wi-Fi 802.11n_20 MHz (20.57 dBm) / Wi-Fi 802.11n_40 MHz (20.64 dBm)		
	Average	Wi-Fi 802.11b(16.85 dBm) / Wi-Fi 802.11g (13.96 dBm) / Wi-Fi 802.11n_20 MHz (13.03 dBm) / Wi-Fi 802.11n_40 MHz (13.29 dBm)		
Modulation Type	DSSS/CC	DSSS/CCK(802.11b), OFDM(802.11g, 802.11n)		
Antenna Specification	Manufacturer: LS Mtron Co.Ltd.			
	Antenna type: Internal Antenna			
	Peak Gair	n : 0.3 dBi		

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3. TEST METHODOLOGY

FCC KDB 558074 D01 DTS Meas Guidance v03r01 dated April 09, 2013 entitled "Guidance for Performing Compliance Measurements on Digital Transmission Systems(DTS) and the measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) 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 13.1.4.1 of ANSI C63.4. (Version :2003) 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 13.1.4.1 of ANSI C63.4. (Version: 2003)

Conducted Antenna Terminal

See Section from 9.1 to 9.2.(KDB 558074)

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.

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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 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 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 February 28, 2014 (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."

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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

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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		PASS
Conducted Maximum Peak Output Power	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band	CONDUCTED	PASS
Band Edge(Out of Band Emissions)	§15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 8.7		PASS
Radiated Spurious Emissions	§15.205, 15.209	cf. Section 8.6.1	BADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.6.2	RADIATED	PASS

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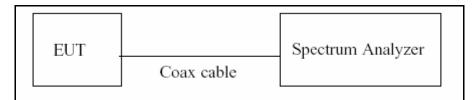


TEST PROCEDURE

According to KDB 558074)6)b), issued 04/09/2013)

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value. Set VBW \geq RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T \leq 16.7 microseconds.)

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested accroding to the zerospan measurement method, 6.0)b) in KDB 558074(issued 04/09/2013)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \le 6.25$ microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/T.

- 1. RBW = 8 MHz (the largest available value)
- 2. VBW = 8 MHz (≥ RBW)
- 3. SPAN = 0 Hz
- 4. Detector = Peak
- 5. Number of points in sweep > 100
- 6. Trace mode = Clear write
- 7. Measure T_{total} and T_{on}
- 8. Calculate Duty Cycle = T_{on}/T_{total} and Duty Cycle Factor = $10^{10}(1/Duty Cycle)$

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Duty Cycle Factor

Mode	Data Rate	T _{on}	T _{total}	Duty Cycle	Duty Cycle Factor
Mode	Dala nale	(ms)	(ms)		(dB)
	1 Mbps	12.200	12.300	0.99186992	0.035
E.	2 Mbps	6.200	6.300	0.98412698	0.069
b	5.5 Mbps	2.385	2.475	0.96363636	0.161
	11 Mbps	1.280	1.380	0.92753623	0.327
	6 Mbs	2.000	2.130	0.93896714	0.273
	9 Mbs	1.330	1.460	0.91095890	0.405
	12 Mbs	1.000	1.130	0.88495575	0.531
	18 Mbs	0.670	0.795	0.84276730	0.743
g	24 Mbs	0.513	0.630	0.81428571	0.892
	36 Mbs	0.348	0.465	0.74838710	1.259
	48 Mbs	0.264	0.378	0.69841270	1.559
	54 Mbs	0.237	0.354	0.66949153	1.743
	6.5 Mbs	1.860	1.990	0.93467337	0.293
	13 Mbs	0.949	1.070	0.88691589	0.521
	19.5 Mbs	0.632	0.760	0.83157895	0.801
n_20 MHz	26 Mbs	0.485	0.610	0.79508197	0.996
BW	39 Mbs	0.339	0.456	0.74342105	1.288
	52 Mbs	0.261	0.375	0.69600000	1.574
	58.5 Mbs	0.234	0.351	0.66666667	1.761
	65 Mbs	0.216	0.327	0.66055046	1.801
	13.5 Mbps	0.896	1.032	0.86821705	0.614
	27 Mbps	0.450	0.591	0.76142132	1.184
	40.5 Mbps	0.303	0.444	0.68243243	1.659
n_40 MHz	54 Mbps	0.237	0.366	0.64754098	1.887
BW	81 Mbps	0.153	0.279	0.54838710	2.609
	108 Mbps	0.140	0.256	0.54687500	2.621
	121.5 Mbps	0.126	0.242	0.52066116	2.834
	135 Mbps	0.120	0.242	0.49586777	3.046

Note : Duty Cycle Factor = 10*log(1/Duty Cycle). where, Duty Cycle = T_{on} / T_{total}

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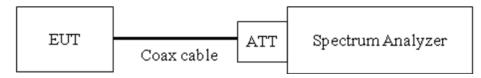
8.2 6dB BANDWIDTH (802.11b/g/n)

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 (Page 5 in KDB 558074, issued 04/09/2013)

RBW = 100 kHz VBW ≥ 3 x RBW Detector = Peak Trace mode = max hold Sweep = auto couple Allow the trace to stabilize

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

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802.11b Mo	ode	Measured Bandwidth	Minimum Bandwidth	
Frequency [MHz]	Channel No.	[MHz]	[MHz]	Pass / Fail
2412	1	10.03	0.500	Pass
2437	6	9.57	0.500	Pass
2462	11	10.03	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11b

Conducted 6dB Bandwidth Measurements for 802.11g

802.11g Mode		Measured Bandwidth	Minimum Bandwidth	
Frequency [MHz]	Channel No.	[MHz]	[MHz]	Pass / Fail
2412	1	16.39	0.500	Pass
2437	6	15.05	0.500	Pass
2462	11	16.42	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mo	ode	Measured Bandwidth	Minimum Bandwidth	
Frequency [MHz]	Channel No.	[MHz]	[MHz]	Pass / Fail
2412	1	17.62	0.500	Pass
2437	6	15.18	0.500	Pass
2462	11	17.64	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11n_40 MHz BW

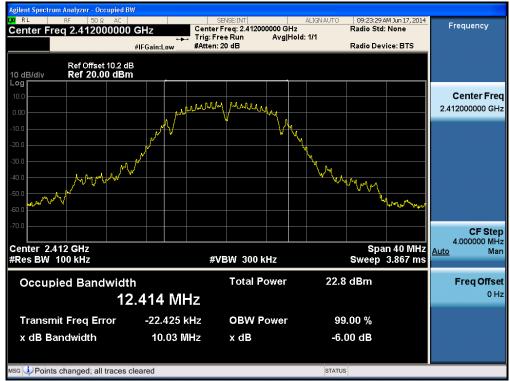
802.11n Mc	Measured Bandwidth Minimum Bandwidth			
Frequency [MHz]	Channel No.	[MHz]	[MHz]	Pass / Fail
2422	3	35.26	0.500	Pass
2437	6	35.30	0.500	Pass
2452	9	35.31	0.500	Pass

Note : In order to simplify the report, attached plots were only the most wide 6 dB BW channel.

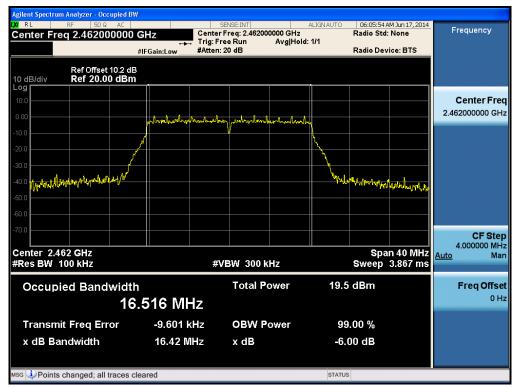
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6dB Bandwidth plot (802.11b-CH 1)

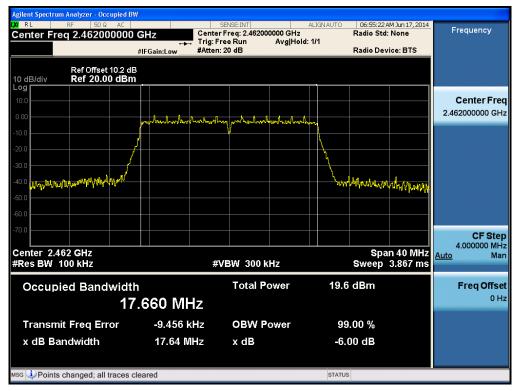


6dB Bandwidth plot (802.11g-CH 11)



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6dB Bandwidth plot (802.11n-CH 11) _20 MHz BW

6dB Bandwidth plot (802.11n-CH 9) _40 MHz BW

Agilent Spectrum A	RF 50 Ω	AC 0000	GHz	Trig:	SENSE:INT er Freq: 2.4520 Free Run		ALIGN A	AUTO	Radio Std		Freque	ncy
			¥IFGain:Lov	v #Atte	n:20 dB				Radio Dev	ice: BTS		
10 dB/div	Ref Offset Ref 20.0											
Log 10.0 0.00											Cento 2.4520000	e r Freq 000 GHz
-10.0			ral halah	ung what had a dealer of the second sec	alwang prosedualities	ahaan lalululu).					
-20.0												
-40.0 -50.0	Jogon Hunsold rate	mahan						horn	www.hutuur	hiphiliphine and the		
-60.0												
-70.0											8 0000	F Step
Center 2.452 #Res BW 10				:	#VBW 300	kHz			Spa Sweep	n 80 MHz 7.667 ms	<u>Auto</u>	Man
Occupie	d Band	width			Total F	ower		19.6	dBm		Freq	Offset
		35.	774	MHz								0 Hz
Transmit	Freq Err	or	-54.23	35 kHz	OBW I	Power		99	.00 %			
x dB Ban	dwidth		35.3	1 MHz	x dB			-6.0	00 dB			
MSG Doints ch	anged: all t	races cle	eared					STATUS				
4												

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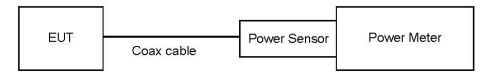
8.3 OUTPUT POWER (802.11b/g/n)

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

The transmitter output is connected to the input of an RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

■ TEST CONFIGURATION(20 MHz BW)



■ TEST PROCEDURE(20 MHz BW)

- Peak Power (Procedure 9.1.3 in KDB 558074, issued 04/09/2013)
 - 1. Measure the peak power of the transmitter.
- Average Power (Procedure 9.2.3.1 in KDB 558074, issued 04/09/2013)
 - 1. Measure the duty cycle.
 - 2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 - 3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Note :

1. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 20.2 dB is offset for 2.4 GHz Band.

Actual value of loss for the attenuator and cable combination is below table.

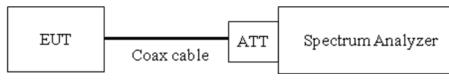
Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	20.21
	2437	20.24
	2462	20.24

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

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■ TEST CONFIGURATION(40 MHz BW)



TEST PROCEDURE(40 MHz BW)

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

The Spectrum Analyzer is set to

Peak Power (Procedure 9.1.2 in KDB 558074, issued 04/09/2013)

RBW = 1 MHz

 $VBW \ge 3 \times RBW$

SPAN ≥ 1.5 x DTS bandwidth

Detector Mode = Peak

Sweep = auto couple

Trace Mode = max hold

Allow trace to fully stabilize.

Use the instrument's band/channel power measurement function with the band limits set equal to the

DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector).

Average Power (Procedure 9.2.2.4 in KDB 558074, issued 04/09/2013)

Measure the duty cycle

Set span to at least 1.5 times the OBW

RBW = 1-5 % of the OBW, not to exceed 1 MHz.

VBW \geq 3 x RBW.

Number of points in sweep $\ge 2 \times \text{span} / \text{RBW}$. (This gives bin-to-bin spacing $\le \text{RBW}/2$,

so that narrowband signals are not lost between frequency bins.)

Sweep time = auto.

Detector = RMS(i.e., power averaging)

Do not use sweep triggering. Allow the sweep to "free run".

Trace average at least 100 traces in power averaging(RMS) mode.

Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.

Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F



Sample Calculation

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor Output Power = 10 dBm + 20 dB + 0.8 dB + 0.2 dB = 31.0 dBm

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. So, 10.2 dB is offset for 2.4 GHz Band and

Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	20.21
	2437	20.24
	2462	20.24

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

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP, Hotspot support	FCC ID: ZNFD213F



TEST RESULTS-Peak

802.11b	Mode	Rate	Measured	Limit
Frequency[MHz]	Channel No.	(Mbps)	Power(dBm)	(dBm)
		1 Mbps	18.00	30
2412	1	2 Mbps	18.27	30
2412	I	5.5 Mbps	19.75	30
		11 Mbps	21.44	30
	6	1 Mbps	19.33	30
2437		2 Mbps	19.48	30
2437		5.5 Mbps	21.01	30
		11 Mbps	22.72	30
		1 Mbps	17.97	30
2462	11	2 Mbps	18.23	30
	11	5.5 Mbps	19.72	30
		11 Mbps	21.27	30

Conducted Output Power Measurements (802.11b Mode)

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Conducted Out	put Power Measur	ements (802.11g Mode)
		······································

802.11g		Rate	Measured	Limit
Frequency[MHz]	Channel No.	(Mbps)	Power(dBm)	(dBm)
		6 Mbps	19.80	30
		9 Mbps	19.69	30
		12 Mbps	19.56	30
2412	1	18 Mbps	19.66	30
2412	I	24 Mbps	20.17	30
		36 Mbps	19.87	30
		48 Mbps	20.06	30
		54 Mbps	20.09	30
	6	6 Mbps	21.53	30
		9 Mbps	21.49	30
		12 Mbps	21.38	30
2437		18 Mbps	21.11	30
2437		24 Mbps	21.65	30
		36 Mbps	21.69	30
		48 Mbps	21.79	30
		54 Mbps	21.73	30
		6 Mbps	20.28	30
		9 Mbps	20.37	30
		12 Mbps	20.20	30
2462	11	18 Mbps	19.63	30
2402		24 Mbps	20.55	30
		36 Mbps	20.50	30
		48 Mbps	20.68	30
		54 Mbps	20.67	30

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
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Conducted Output Power Measurements (802.11n Mode) _20 MHz BW

802.11n	· · ·	Rate	Measured	Limit
Frequency[MHz]	Channel No.	(Mbps)	Power(dBm)	(dBm)
Frequency[winz]	Channel NO.	,		
		6.5 Mbps	19.78	30
		13 Mbps	19.68	30
		19.5 Mbps	19.67	30
2412	1	26 Mbps	19.88	30
	-	39 Mbps	19.83	30
		52 Mbps	19.99	30
		58.5 Mbps	19.97	30
		65 Mbps	20.02	30
		6.5 Mbps	20.40	30
	6	13 Mbps	20.20	30
		19.5 Mbps	20.17	30
2437		26 Mbps	20.39	30
2437		39 Mbps	20.43	30
		52 Mbps	20.54	30
		58.5 Mbps	20.53	30
		65 Mbps	20.50	30
		6.5 Mbps	20.31	30
		13 Mbps	20.11	30
		19.5 Mbps	19.93	30
0460	14	26 Mbps	20.51	30
2462	11	39 Mbps	20.44	30
		52 Mbps	20.56	30
		58.5 Mbps	20.57	30
		65 Mbps	20.52	30

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP. Hotspot support	FCC ID: ZNFD213F
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Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n	· ·	Rate	Measured	Limit
Frequency[MHz]	Channel No.	(Mbps)	Power(dBm)	(dBm)
		13.5 Mbps	19.82	30
		27 Mbps	19.75	30
		40.5 Mbps	19.59	30
2422	3	54 Mbps	20.00	30
2422	3	81 Mbps	19.91	30
		108 Mbps	19.96	30
		121.5 Mbps	19.92	30
		135 Mbps	19.83	30
		13.5 Mbps	20.29	30
	6	27 Mbps	20.19	30
		40.5 Mbps	20.21	30
2437		54 Mbps	20.64	30
2437		81 Mbps	20.45	30
		108 Mbps	20.43	30
		121.5 Mbps	20.44	30
		135 Mbps	20.42	30
		13.5 Mbps	20.04	30
		27 Mbps	20.02	30
2452		40.5 Mbps	19.80	30
	9	54 Mbps	20.23	30
	5	81 Mbps	20.14	30
		108 Mbps	20.19	30
		121.5 Mbps	20.21	30
		135 Mbps	20.27	30

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TEST RESULTS-Average

802.11b Mode					Measured	
Frequency [MHz]	Channel No.	Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Power(dBm) + Duty Cycle Factor	Limit (dBm)
		1 Mbps	15.25	0.035	15.29	30
2412	4	2 Mbps	15.18	0.069	15.25	30
2412	1	5.5 Mbps	15.14	0.161	15.30	30
		11 Mbps	14.94	0.327	15.26	30
	6	1 Mbps	16.68	0.035	16.71	30
0407		2 Mbps	16.45	0.069	16.52	30
2437		5.5 Mbps	16.69	0.161	16.85	30
		11 Mbps	16.35	0.327	16.68	30
		1 Mbps	15.22	0.035	15.25	30
2462	11	2 Mbps	15.24	0.069	15.31	30
	11	5.5 Mbps	15.26	0.161	15.42	30
		11 Mbps	15.09	0.327	15.42	30

Conducted Output Power Measurements (802.11b Mode)

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
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Conducted Output Power Measurements (802.11g Mode)

802.11g N		•		· · · ·	Measured	
Frequency [MHz]	Channel No.	Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Power(dBm) + Duty Cycle Factor	Limit (dBm)
		6 Mbps	11.84	0.273	12.12	30
		9 Mbps	11.63	0.405	12.04	30
		12 Mbps	11.59	0.531	12.12	30
2412	1	18 Mbps	11.46	0.743	12.21	30
2412	I I	24 Mbps	11.32	0.892	12.21	30
		36 Mbps	10.77	1.259	12.03	30
		48 Mbps	10.50	1.559	12.05	30
		54 Mbps	10.39	1.743	12.13	30
	6	6 Mbps	13.66	0.273	13.94	30
		9 Mbps	13.56	0.405	13.96	30
		12 Mbps	13.43	0.531	13.96	30
2437		18 Mbps	13.06	0.743	13.80	30
2437		24 Mbps	12.92	0.892	13.82	30
		36 Mbps	12.57	1.259	13.83	30
		48 Mbps	12.34	1.559	13.90	30
		54 Mbps	12.20	1.743	13.95	30
		6 Mbps	12.26	0.273	12.53	30
		9 Mbps	12.13	0.405	12.53	30
2462		12 Mbps	12.11	0.531	12.64	30
	44	18 Mbps	11.70	0.743	12.44	30
	11	24 Mbps	11.56	0.892	12.45	30
		36 Mbps	11.24	1.259	12.49	30
		48 Mbps	10.98	1.559	12.54	30
		54 Mbps	10.88	1.743	12.62	30

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Conducted Output Power Measurements (802.11n Mode)_ 20 MHz BW

802.11n					Measured	
Frequency [MHz]	Channel No.	Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Power(dBm) + Duty Cycle Factor	Limit (dBm)
		6.5 Mbps	11.75	0.293	12.04	30
		13 Mbps	11.60	0.521	12.12	30
		19.5 Mbps	11.41	0.801	12.21	30
2412	1	26 Mbps	11.27	0.996	12.26	30
2412	I	39 Mbps	10.64	1.288	11.92	30
		52 Mbps	10.38	1.574	11.95	30
		58.5 Mbps	10.31	1.761	12.07	30
		65 Mbps	10.21	1.801	12.01	30
		6.5 Mbps	12.62	0.293	12.92	30
	6	13 Mbps	12.43	0.521	12.95	30
		19.5 Mbps	12.23	0.801	13.03	30
2437		26 Mbps	11.81	0.996	12.81	30
2437		39 Mbps	11.54	1.288	12.83	30
		52 Mbps	11.27	1.574	12.84	30
		58.5 Mbps	11.19	1.761	12.95	30
		65 Mbps	11.07	1.801	12.87	30
		6.5 Mbps	12.22	0.293	12.52	30
		13 Mbps	12.01	0.521	12.53	30
		19.5 Mbps	11.87	0.801	12.67	30
2462	44	26 Mbps	11.48	0.996	12.48	30
	11	39 Mbps	11.22	1.288	12.51	30
		52 Mbps	10.99	1.574	12.56	30
		58.5 Mbps	10.84	1.761	12.60	30
		65 Mbps	10.74	1.801	12.54	30

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Conducted Output Power Measurements (802.11n Mode) _40 MHz BW

802.11n			Surements (002.		Measured	
Frequency [MHz]	Channel No.	Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Power(dBm) + Duty Cycle Factor	Limit (dBm)
		13.5 Mbps	11.44	0.614	12.06	30
		27 Mbps	11.17	1.184	12.36	30
		40.5 Mbps	10.91	1.659	12.57	30
2422	3	54 Mbps	10.38	1.887	12.26	30
2422	3	81 Mbps	9.94	2.609	12.55	30
		108 Mbps	9.62	2.621	12.24	30
		121.5 Mbps	9.34	2.834	12.17	30
		135 Mbps	9.28	3.046	12.32	30
		13.5 Mbps	11.95	0.614	12.56	30
	6	27 Mbps	11.63	1.184	12.81	30
		40.5 Mbps	11.37	1.659	13.03	30
0407		54 Mbps	11.05	1.887	12.94	30
2437		81 Mbps	10.68	2.609	13.29	30
		108 Mbps	10.07	2.621	12.69	30
		121.5 Mbps	9.96	2.834	12.79	30
		135 Mbps	9.84	3.046	12.88	30
		13.5 Mbps	11.68	0.614	12.29	30
		27 Mbps	11.34	1.184	12.53	30
		40.5 Mbps	11.06	1.659	12.72	30
2452	<u> </u>	54 Mbps	10.56	1.887	12.44	30
	9	81 Mbps	10.17	2.609	12.78	30
		108 Mbps	9.83	2.621	12.45	30
		121.5 Mbps	9.74	2.834	12.57	30
		135 Mbps	9.63	3.046	12.68	30

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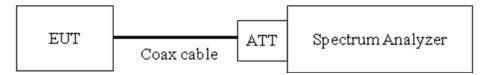
8.4 POWER SPECTRAL DENSITY (802.11b/g/n)

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 Procedure 10.2 in KDB 558074, issued 04/09/2013

The spectrum analyzer is set to :

Set analyzer center frequency to DTS channel center frequency.

Span = 1.5 times the DTS channel bandwidth.

 $RBW = 3 kHz \le RBW \le 100 kHz.$

VBW \geq 3 x RBW.

Sweep = auto couple

Detector = peak

Trace Mode = max hold

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea)

Output Power = -5 dBm + 10 dB + 0.8 dB = 5.8 dBm

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. So, 10.2 dB is offset for 2.4 GHz Band.

Actual value of loss for the attenuator and cable combination is below table.

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Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

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

TEST RESULTS

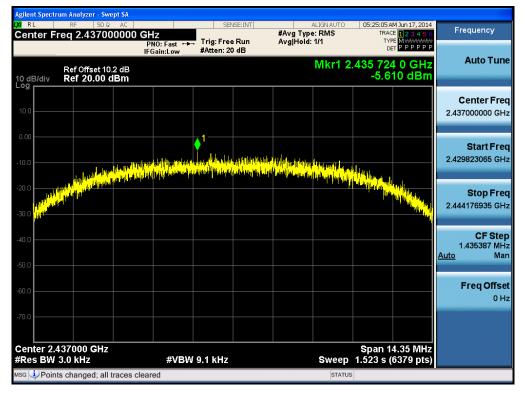
Frequency	Channel		Test Result		
Frequency (MHz)	Channel No.	Mode	PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1		-7.724	8	Pass
2437	6	802.11b	-5.610	8	Pass
2462	11		-7.282	8	Pass
2412	1		-12.834	8	Pass
2437	6	802.11g	-10.226	8	Pass
2462	11		-12.694	8	Pass
2412	1	802.11n	-13.179	8	Pass
2437	6	(20 MHz	-12.728	8	Pass
2462	11	BW)	-13.932	8	Pass
2422	3	802.11n	-15.759	8	Pass
2437	6	(40 MHz BW)	-14.969	8	Pass
2452	9		-17.144	8	Pass

Conducted Power Density Measurements

Note : In order to simplify the report, attached plots were only the highest PSD channel.

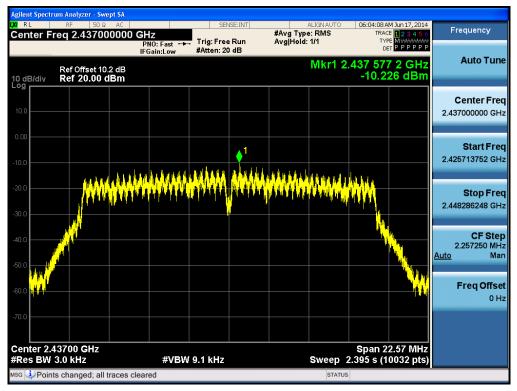
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP, Hotspot support	FCC ID: ZNFD213F
	•		





Power Spectral Density (802.11b-CH 6)

Power Spectral Density (802.11g-CH 6)



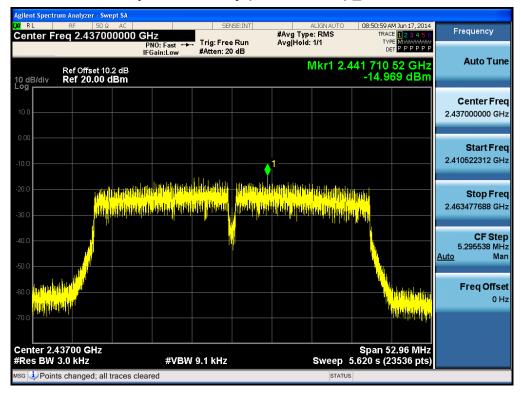
FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
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Power Spectral Density (802.11n-CH 6) 20 MHz BW

Power Spectral Density (802.11n-CH 6) _ 40 MHz BW



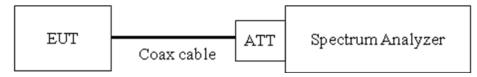
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
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8.5 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS 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 § 15.205(c)).

Limit : 20 dBc TEST CONFIGURATION



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. (Procedure 11.0 in KDB 558074, issued 04/09/2013)

RBW = 100 kHz

VBW ≥ 3 x RBW

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep time = auto couple

Ensure that the number of measurement points ≥ Span/RBW

Allow trace to fully stabilize.

Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 10th harmonic 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. So, 10.2 dB is

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offset for 2.4 GHz Band. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

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

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

5. In order to simplify the report, attached plots were only the worst case channel.

Freq(MHz) Factor(dB) 30 9.95 100 10.01 200 10.03 300 10.04 400 10.05 10.04 500 600 10.03 700 10.09 800 10.10 900 10.08 10.11 1000 2000 10.25 2400* 10.19 2500* 10.26 3000 10.27 4000 10.22 5000 10.48 5700* 10.42 5800* 10.48 6000 10.48 7000 10.57 8000 10.45 9000 10.50 10000 10.64 11000 10.69 12000 10.75

FACTORS FOR FREQUENCY

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
		Page 3 1 of 68	



10.92
11.90
11.00
11.03
10.93
10.96
10.85
12.11
11.17
10.99
11.12
11.10
11.42

Note : 1. "' is fundamental frequency range.

2. Factor = Cable loss + Attenuator loss

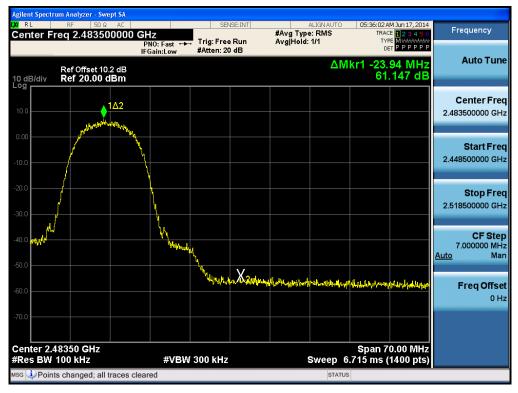
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F



Agilent Spectrum Analyzer - Swept SA RL 09:26:38 AM Jun 17, 2014 #Avg Type: RMS Avg|Hold: 1/1 Frequency Center Freq 2.400000000 GHz TRACE 123456 TYPE MWWWW DET PPPPP PNO: Fast ↔→ IFGain:Low Trig: Free Run #Atten: 20 dB Auto Tune ∆Mkr1 12.19 MHz 45.039 dB Ref Offset 10.2 dB Ref 20.00 dBm 10 dB/div Log **Center Freq** <mark>∧1∆2</mark> 2.400000000 GHz տ/կ Start Freq 2.375000000 GHz Stop Freq 2.425000000 GHz Xa M M CF Step 5.000000 MHz <u>Auto</u> Man handered and many har and the second and the second and the second s **Freq Offset** 0 Hz Span 50.00 MHz Sweep 4.795 ms (1000 pts) Center 2.40000 GHz #VBW 300 kHz #Res BW 100 kHz G iPoints changed; all traces cleared STATUS

BandEdge (802.11b-CH1)

BandEdge (802.11b-CH11)



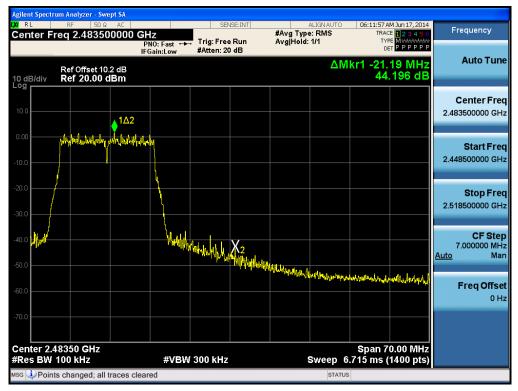
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
	•	Page 3.3 of 68	



gilent Spectrum Analyzer - Swept SA (M) RL RF 50 Ω AC | Center Freq 2.400000000 GHz PN0: Fast ↔→→ IFGain:Low #Atten: 20 dB 52 AM Jun 17, 2014 RACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P Frequency #Avg Type: RMS Avg|Hold: 1/1 Auto Tune ∆Mkr1 19.09 MHz 37.585 dB Ref Offset 10.2 dB Ref 20.00 dBm 10 dB/div Log **Center Freq** 2.40000000 GHz 142 Julinhul In the Start Freq 2.375000000 GHz Stop Freq 2.425000000 GHz X2 CF Step 5.000000 MHz Morthework Auto Man AN WAY NUMILIAN Freq Offset 0 Hz Center 2.40000 GHz #Res BW 100 kHz Span 50.00 MHz Sweep 4.795 ms (1000 pts) #VBW 300 kHz G 😳 Points changed; all traces cleared

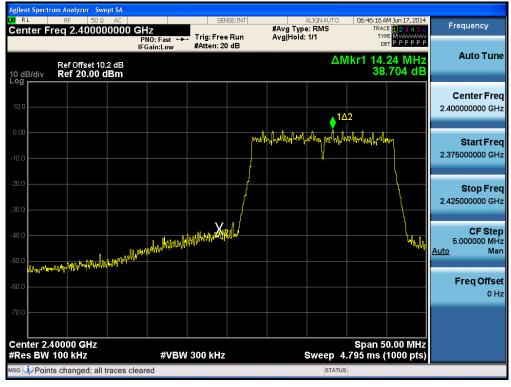
BandEdge (802.11g-CH1)

BandEdge (802.11g-CH11)



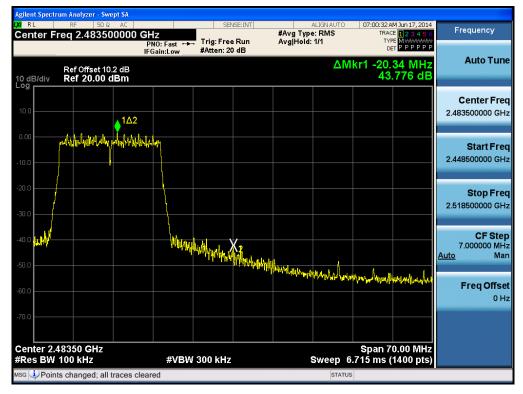
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
	•	Page 3.4 of 68	





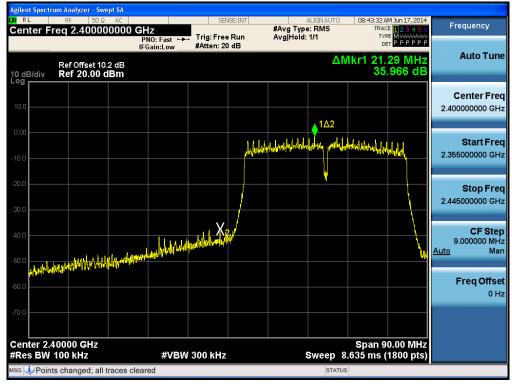
Band Edge (802.11n-CH1) _ 20 MHz BW

Band Edge (802.11n-CH11) _ 20 MHz BW



FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
		Page 3.5 of 68	





Band Edge (802.11n-CH1) _ 40 MHz BW

Band Edge (802.11n-CH11) _ 40 MHz BW

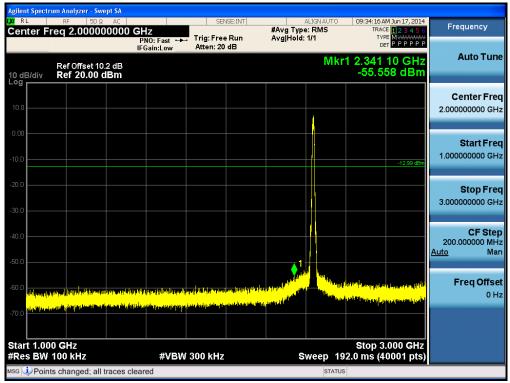


FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
		Page 3.6 of 68	



			-			•	_		-	
Agilent Spectru	um Analyzer - Swep	t SA								
LXI RL	RF 50 Ω	AC		SEN	ISE:INT		ALIGN AUT	0 09:34:30/	AM Jun 17, 2014	
Center Fr	eq 515.0000	000 MHz				#Avg Type	e: RMS	TRA	CE 123456	Frequency
oontor n	00 010.0000	PNO:	Fast ↔	Trig: Free		Avg Hold:	1/1	TY	PE M WANNAM	
		IFGai		Atten: 20	dB			C	ет РРРРР	
								Mkr1 644	20 8411-	Auto Tune
	Ref Offset 10.2	dB								
10 dB/div	Ref 20.00 dE	3m						-58.6	95 dBm	
Log										
										Center Freq
										•
10.0										515.000000 MHz
0.00										
0.00										Otherst Engen
										Start Freq
-10.0										30.000000 MHz
-10.0									-12.99 dBm	
-20.0										
										Stop Freq
										1.000000000 GHz
-30.0										
										CF Step
-40.0										
										97.000000 MHz
										<u>Auto</u> Man
-50.0										
						<u>_</u> 1				
										Freg Offset
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	and and a constantial side and a	In stand & stand stands	And and a strength of the	وخدائد ويعرجه فالتدر	بالع الميأمين والمطالبة الالأ	والابتان حط طوط حل اهت	and the second lines	لقاسته وأوجعت وحفقا وتناصله	(Installed from)	0 H2
-70.0	and a later of the second second second	the state of the s								
40.0										
Start 30.0	MHz							Stop 1.	0000 GHz	
#Res BW	100 kHz		#VBW	300 kHz		s	weep	93.33 ms (2	20000 pts)	
мsg 🤳 Point	s changed; all tra	aces cleared					STA	TUS		

1 GHz ~ 3 GHz

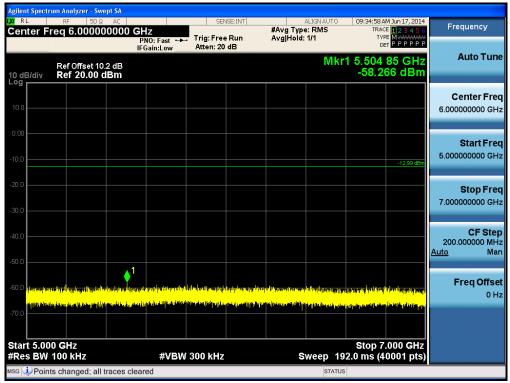


FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
		Page 3.7 of 68	



	n Analyzer - Swept SA						
LXI RL	RF 50 Ω AC		SENSE:INT		LIGN AUTO	09:34:44 AM Jun 17, 2014	
Center Fre	eq 4.0000000000	GHz PNO: Fast ↔→→ IFGain:Low	Trig: Free Run Atten: 20 dB	#Avg Type Avg Hold: ^		TRACE 12345 TYPE MWWWW DET PPPP	
	Ref Offset 10.2 dB Ref 20.00 dBm				Mkr1	3.652 50 GHz -53.227 dBm	
10.0							Center Freq 4.000000000 GHz
-10.0						-12.99 dBr	Start Freq 3.000000000 GHz
-20.0							Stop Freq 5.000000000 GHz
-40.0		11					CF Step 200.000000 MHz <u>Auto</u> Man
	n bergen som						Freq Offset 0 Hz
-10.0			a di si se d Si se di si s	n y filling finlanding og en af det samste fillinged det fi			
Start 3.000 #Res BW 1		#VBW 3	800 kHz	Sv	veep 192	Stop 5.000 GHz 2.0 ms (40001 pts	
мsg 🗼 Points	changed; all traces c	eared			STATUS		

5 GHz ~ 7 GHz

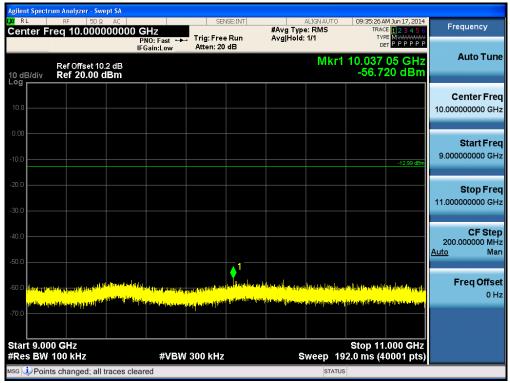


FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
		Page 3.8 of 68	



A - Hannak Barranakan		-1.04	-			-			-	-
Agrient Spectru	m Analyzer - Swe RF 50 Ω	AC		CEN	ISE:INT		ALIGN AUTO	00,25,12,0	M Jun 17, 2014	
	eq 8.00000		-		19511/11	#Avg Type				Frequency
Center Fr	eq 8.00000	PI	IZ 10: Fast ↔ Gain:Low	Trig: Free Atten: 20		Avg Hold:		TYF	E 123456 E M WWWWW T P P P P P P	
10 dB/div	Ref Offset 10. Ref 20.00 d						Mł	(r1 7.569 -57.2	35 GHz 02 dBm	Auto Tune
10.0										Center Freq 8.00000000 GHz
-10.0									-12.99 dBm	Start Freq 7.000000000 GHz
-20.0										Stop Freq 9.00000000 GHz
-40.0										CF Step 200.000000 MHz <u>Auto</u> Man
-60.0 <mark>Physica</mark> n	terrelation to the second							unatileta dana fitos di ban pri se		Freq Offset 0 Hz
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Start 7.000			40 (1914)	000 ku-				Stop 9	.000 GHz	
#Res BW 1	IUU KHZ		#VBW	300 kHz		s	weep 1	192.0 ms (4	UUUT pts)	
мsg 🤙 Points	changed; all t	traces clear	ed				STAT	US		

9 GHz ~ 11 GHz

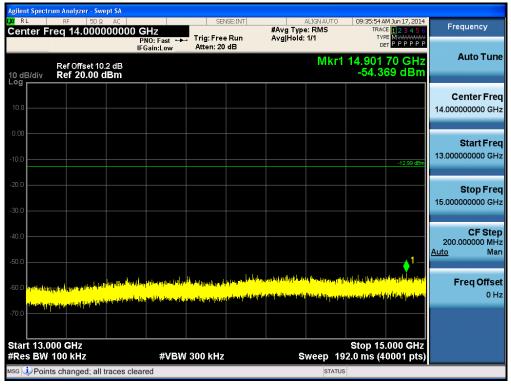


FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
	•	Page 3.9 of 68	



							_		-	-
Agilent Spectr	um Analyzer - Swe	pt SA								
LXI RL		AC		SEN	ISE:INT		ALIGN AUT	O 09:35:40.4	M Jun 17, 2014	
	req 12.0000		<u>Ц</u> 7			#Avg Type			E 123456	Frequency
Center F	req 12.0000	00000 6	NO:Fast ↔	Trig: Free	Run	Avg Hold:		TYP	PE M WARANANA	
			NO: Fast Gain:Low	Atten: 20				DE	ТРРРРР	
			Jam.cow				_			Auto Tune
	Ref Offset 10.	2 40					Mk	r1 12.814	65 GHz	Autorune
10 dB/div	Ref 20.00 d	2 ub						-56.1	88 dBm	
	Kei 20.00 u									
										Center Freq
10.0										12.00000000 GHz
										12.00000000 GH2
0.00										
										Start Freq
-10.0										11.00000000 GHz
									-12.99 dBm	
-20.0										
										Stop Freq
										13.00000000 GHz
-30.0										
										05.04+*
-40.0										CF Step
										200.000000 MHz
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	a second second de la	e en estatue e e e				ini ana ara-ara-ara-	فللجز ومرطلة بحور	فريتها فأراده والمتحر والمتحر والمتحد والم	in a state of the part of	0 Hz
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-70.0										
Start 11.0								Stop 42	.000 GHz	
				000				atop 13	.000 GHZ	
#Res BW	100 KHZ		#VBW	300 kHz		s	weep	192.0 ms (4	0001 pts)	
мsg 🤳 Point	ts changed; all t	races clear	ed				STA	TUS		

13 GHz ~ 15 GHz



FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
	•		



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Agilen	nt Spectru	im Ana	alyzer - Sv	vept SA								
LXI R	L	RF	50 \$	2 AC		SEI	VSE:INT		ALIGNAUTO	09:36:08 A	M Jun 17, 2014	
Cen	ter Ér	ea '		000000	GH ₇			#Avg Typ	e: RMS	TRAC	E 123456	Frequency
00		сq	10.000	000000	PNO: Fast +	🛻 Trig: Free	e Run	AvgHold	1/1	TYF	E M WWWWWW	
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									B.4.Lend	40.005		Auto Tune
		Ref	Offset 10).2 dB					IVIKE	16.825		
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												Start Freq
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	of contrast of the	1.1 × 1.	רוויידיי דרי	- Aller and the		الاندارات اعاقف الطالة فالك		a land the land of				UHZ
-70.0												
Star	t 15.00)0 G	Hz							Stop 17	.000 GHz	
	s BW				#VB	W 300 kHz		S	weep 19)2.0 ms (4		
MSG 🤇	Points	s cha	nged; all	traces cl	eared				STATU	S		
-	and the second division of the second divisio	_	and the second se						and the second se			

17 GHz ~ 19 GHz

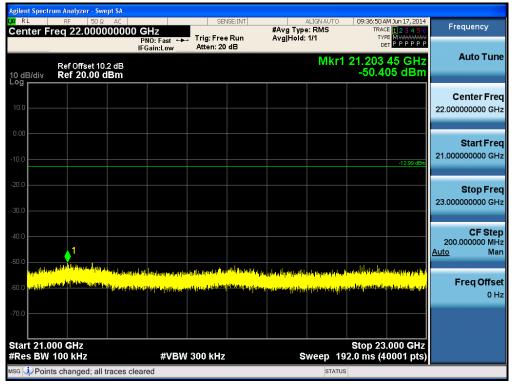
Agilent Spectr	um Analyzer - Swe	pt SA								
LXIRL	RF 50Ω			SEN	ISE:INT	#Avg Typ	ALIGN AUTO		M Jun 17, 2014	Frequency
Center F	req 18.0000	Р	NO: Fast ↔ Gain:Low	Trig: Free Atten: 20		Avg Hold:		TYI		
10 dB/div Log	Ref Offset 10.: Ref 20.00 d	2 dB Bm					Mkr1	18.580 -53.0	75 GHz 21 dBm	Auto Tune
10.0										Center Freq 18.00000000 GHz
-10.0									-12.99 dBm	Start Freq 17.000000000 GHz
-20.0										Stop Freq 19.000000000 GHz
-40.0								1		CF Step 200.000000 MHz <u>Auto</u> Man
-60.0 <mark>Markedo</mark>	dentificity of the first of the design of the second second second second second second second second second s	of the second second	a ikan yuka dara apalan ciraa (ar					ad tea de la constant de la constant En la constant de la c	dini dia manifesia Ana dia mangini dia	Freq Offset 0 Hz
-70.0 Start 17.0									.000 GHz	
#Res BW				300 kHz		s			0001 pts)	
MSG 🤍 Poin	ts changed; all t	races clear	ed				STATUS	3		

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
		Page 4 1 of 68	



Agilent Spectr	um Analyzer - Swe	nt SA								
IXI RL		AC		SEN	SE:INT		ALIGN AUT	0 09:36:36 A	4 Jun 17, 2014	
Center Fr	req 20.0000		Hz			#Avg Type	: RMS	TRAC	123456	Frequency
		Р	NO: Fast 🔸	Trig: Free		Avg Hold:	1/1	TYP	E MWWWWW T P P P P P P	
		IFO	Gain:Low	Atten: 20	dB					
	Ref Offset 10.	2 48					Mk	r1 20.573		Auto Tune
10 dB/div	Ref 20.00 d							-50.94	11 dBm	
Log										
										Center Freq
10.0										20.000000000 GHz
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0.00										
0.00										Start Freq
-10.0									-12.99 dBm	19.00000000 GHz
-20.0										
										Stop Freq
										21.00000000 GHz
-30.0										
										05.04
-40.0										CF Step 200.000000 MHz
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-70.0										
Start 19.0									000 GHz	
#Res BW	100 kHz		#VBW	300 kHz		S	weep	192.0 ms (4	0001 pts)	
мsg 🤳 Point	s changed; all t	races clear	ed				STA	TUS		

21 GHz ~ 23 GHz



FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
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										II.0_11		
Agilen	t Spectr	ım Analyze	r - Swept S	A								
L XI R			50 Ω A(SEN	ISE:INT		ALIGN AUTO		AM Jun 17, 2014	Frequency
Cen	ter Fr	eq 24.0	000000	000 G	Hz 10: Fast ↔	. Trig: Free		#Avg Type Avg Hold:		т	ACE 123456 YPE MWWWW	Frequency
				IFC	Gain:Low	Atten: 20	dB				DETPPPPP	
40	34-11		et 10.2 dl						Mki	r1 24.571 -49 ۲	70 GHz)23 dBm	Auto Tune
10 di Log	3/017	Rel 20	.00 dBn						1			
												Center Freq
												24.000000000 GHz
												24.000000000000
												Start Freq
-10.0												23.00000000 GHz
											-12.99 dBm	
-20.0												
												Stop Freq
-30.0												25.00000000 GHz
-40.0												CF Step
										• 1		200.000000 MHz
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										dina da pana kata kata kata kata kata kata kata k		Freq Offset
	a sa a s			didarit of								0 Hz
Star	t 23.0	00 GHz								Stop 2	5.000 GHz	
		100 kHz			#VBW	300 kHz		S	weep	192.0 ms (
MSG 🤇	Point	s change	d; all trace	es clear	ed				STA	TUS		

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT				
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:			
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F			



8.6 RADIATED MEASUREMENT. 8.6.1 RADIATED SPURIOUS EMISSIONS.

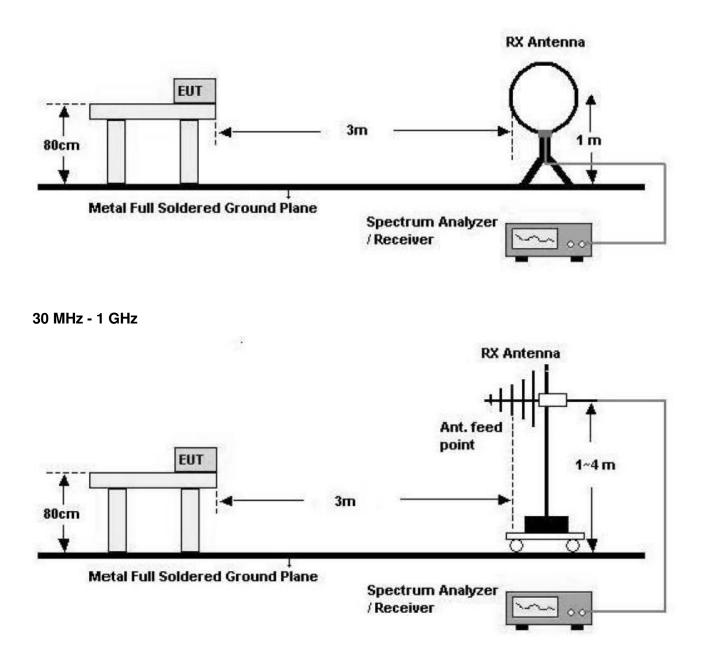
Test Requirements and limit, §15.205, §15.209

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		

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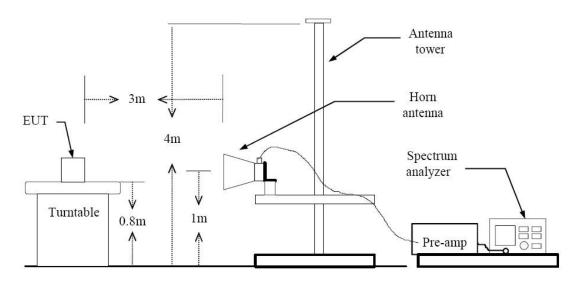


Below 30 MHz



FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
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TEST PROCEDURE USED

Method 12.1 in KDB 558074, issued 04/09/2013

Spectrum Setting

- Peak

Peak emission levels are measured by setting the instrument as follows:

RBW = cf. Table 1.

VBW \geq 3 x RBW.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweeps to continue until the trace stabilizes.

(Note that the required measurement time may be longer for low duty cycle applications).

Table 1 — NDW as a function of	nequency
Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

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- Average

Set RBW = 1 MHz

Set VBW \geq 1/T.(at least 100 times less than the resolution bandwidth, but no less than 10 Hz.)

Select spectrum analyzer linear display mode.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Note :

- 1. We are performed the RSE and radiated band edge using standard radiated method.
- 2. The actual setting value of VBW for 802.11 b/g/n $\,$

Mode	Worst Data rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
b	1	12.200	12.300	99.19	82	1000
g	6	2.000	2.130	93.90	500	1000
n_20 MHz BW	6.5	1.860	1.990	93.47	538	1000
n_40 MHz BW	13	0.896	1.032	86.82	1116	3000

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TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

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

- 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 (dBuV) + Distance extrapolation factor
- 5. 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. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP. Hotspot support	FCC ID: ZNFD213F
1101-11-1400-1 042	5011e 20, 2014		



Below 1 GHz

Operation Mode: Normal Mode

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

- 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.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP, Hotspot support	FCC ID:
HCT-R-1406-F042	June 20, 2014		ZNFD213F



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

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4824	51.62	-4.25	V	47.37	73.98	26.61	PK
4824	38.29	-4.25	V	34.04	53.98	19.94	AV
7236	51.99	5.21	V	57.20	73.98	16.78	PK
7236	38.17	5.21	V	43.38	53.98	10.60	AV
4824	52.17	-4.25	Н	47.92	73.98	26.06	PK
4824	38.35	-4.25	Н	34.10	53.98	19.88	AV
7236	52.09	5.21	Н	57.30	73.98	16.68	PK
7236	37.96	5.21	Н	43.17	53.98	10.81	AV

Operation Mode: Transfer Rate: Operating Frequency

Channel No.

802.11 g	
6 Mbps	
2412	
01 Ch	

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4824	52.29	-4.25	V	48.04	73.98	25.94	PK
4824	38.39	-4.25	V	34.14	53.98	19.84	AV
7236	51.43	5.21	V	56.64	73.98	17.34	PK
7236	37.80	5.21	V	43.01	53.98	10.97	AV
4824	52.86	-4.25	Н	48.61	73.98	25.37	PK
4824	38.23	-4.25	Н	33.98	53.98	20.00	AV
7236	51.57	5.21	Н	56.78	73.98	17.20	PK
7236	37.94	5.21	Н	43.15	53.98	10.83	AV

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT				
Test Report No. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP. Hotspot support	FCC ID: ZNFD213F			
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Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4824	51.21	-4.25	V	46.96	73.98	27.02	PK
4824	38.32	-4.25	V	34.07	53.98	19.91	AV
7236	51.92	5.21	V	57.13	73.98	16.85	PK
7236	38.04	5.21	V	43.25	53.98	10.73	AV
4824	52.01	-4.25	Н	47.76	73.98	26.22	PK
4824	38.37	-4.25	Н	34.12	53.98	19.86	AV
7236	51.30	5.21	Н	56.51	73.98	17.47	PK
7236	37.83	5.21	Н	43.04	53.98	10.94	AV

802.11 n_40 MHz BW
13.5 Mbps
2422
03 Ch

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4844	52.61	-3.90	V	48.71	73.98	25.27	PK
4844	38.19	-3.90	V	34.29	53.98	19.69	AV
7266	51.78	4.91	V	56.69	73.98	17.29	PK
7266	37.88	4.91	V	42.79	53.98	11.19	AV
4844	52.52	-3.90	Н	48.62	73.98	25.36	PK
4844	38.08	-3.90	Н	34.18	53.98	19.80	AV
7266	51.67	4.91	Н	56.58	73.98	17.40	PK
7266	37.95	4.91	Н	42.86	53.98	11.12	AV

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 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.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
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- 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. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
- 6. 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.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
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Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4874	51.33	-3.93	V	47.40	73.98	26.58	PK
4874	37.72	-3.93	V	33.79	53.98	20.19	AV
7311	51.46	4.97	V	56.43	73.98	17.55	PK
7311	37.82	4.97	V	42.79	53.98	11.19	AV
4874	51.32	-3.93	Н	47.39	73.98	26.59	PK
4874	38.15	-3.93	Н	34.22	53.98	19.76	AV
7311	51.45	4.97	Н	56.42	73.98	17.56	PK
7311	38.04	4.97	Н	43.01	53.98	10.97	AV

Operation Mode:	802.11 g
Transfer Rate:	6 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4874	51.97	-3.93	V	48.04	73.98	25.94	PK
4874	37.76	-3.93	V	33.83	53.98	20.15	AV
7311	52.11	4.97	V	57.08	73.98	16.90	PK
7311	37.91	4.97	V	42.88	53.98	11.10	AV
4874	51.72	-3.93	Н	47.79	73.98	26.19	PK
4874	37.85	-3.93	Н	33.92	53.98	20.06	AV
7311	52.44	4.97	Н	57.41	73.98	16.57	PK
7311	37.97	4.97	Н	42.94	53.98	11.04	AV

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Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4874	51.47	-3.93	V	47.54	73.98	26.44	PK
4874	37.71	-3.93	V	33.78	53.98	20.20	AV
7311	51.93	4.97	V	56.90	73.98	17.08	PK
7311	37.99	4.97	V	42.96	53.98	11.02	AV
4874	51.27	-3.93	Н	47.34	73.98	26.64	PK
4874	37.83	-3.93	Н	33.90	53.98	20.08	AV
7311	51.29	4.97	Н	56.26	73.98	17.72	PK
7311	38.07	4.97	Н	43.04	53.98	10.94	AV

Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4874	51.91	-3.93	V	47.98	73.98	26.00	PK
4874	37.66	-3.93	V	33.73	53.98	20.25	AV
7311	52.10	4.97	V	57.07	73.98	16.91	PK
7311	37.87	4.97	V	42.84	53.98	11.14	AV
4874	51.26	-3.93	Н	47.33	73.98	26.65	PK
4874	37.61	-3.93	Н	33.68	53.98	20.30	AV
7311	51.81	4.97	Н	56.78	73.98	17.20	PK
7311	37.89	4.97	Н	42.86	53.98	11.12	AV

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 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.

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- 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. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4924	50.73	-3.75	V	46.98	73.98	27.00	PK
4924	37.11	-3.75	V	33.36	53.98	20.62	AV
7386	51.55	5.60	V	57.15	73.98	16.83	PK
7386	37.84	5.60	V	43.44	53.98	10.54	AV
4924	50.69	-3.75	Н	46.94	73.98	27.04	PK
4924	37.18	-3.75	Н	33.43	53.98	20.55	AV
7386	51.60	5.60	Н	57.20	73.98	16.78	PK
7386	38.07	5.60	Н	43.67	53.98	10.31	AV

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

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4924	51.38	-3.75	V	47.63	73.98	26.35	PK
4924	37.26	-3.75	V	33.51	53.98	20.47	AV
7386	51.98	5.60	V	57.58	73.98	16.40	PK
7386	37.71	5.60	V	43.31	53.98	10.67	AV
4924	51.55	-3.75	Н	47.80	73.98	26.18	PK
4924	37.24	-3.75	Н	33.49	53.98	20.49	AV
7386	52.06	5.60	Н	57.66	73.98	16.32	PK
7386	37.65	5.60	Н	43.25	53.98	10.73	AV

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Operation Mode:	802.11 n_20 MHz BW		
Transfer Rate:	6.5 Mbps		
Operating Frequency	2462		
Channel No.	11 Ch		

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4924	50.86	-3.75	V	47.11	73.98	26.87	PK
4924	37.32	-3.75	V	33.57	53.98	20.41	AV
7386	51.78	5.60	V	57.38	73.98	16.60	PK
7386	38.31	5.60	V	43.91	53.98	10.07	AV
4924	50.97	-3.75	Н	47.22	73.98	26.76	PK
4924	37.11	-3.75	Н	33.36	53.98	20.62	AV
7386	51.35	5.60	Н	56.95	73.98	17.03	PK
7386	37.74	5.60	Н	43.34	53.98	10.64	AV

Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	2452
Channel No.	09 Ch
Channel No.	09 Ch

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4904	50.88	-3.70	V	47.18	73.98	26.80	PK
4904	37.21	-3.70	V	33.51	53.98	20.47	AV
7356	51.54	6.00	V	57.54	73.98	16.44	PK
7356	37.93	6.00	V	43.93	53.98	10.05	AV
4904	50.95	-3.70	Н	47.25	73.98	26.73	PK
4904	37.15	-3.70	Н	33.45	53.98	20.53	AV
7356	52.23	6.00	Н	58.23	73.98	15.75	PK
7356	37.92	6.00	Н	43.92	53.98	10.06	AV

- 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.

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- 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. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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8.6.2 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	Reading	AN.+CL	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	30.69	33.90	Н	64.59	73.98	9.39	PK
2390.0	14.96	33.90	Н	48.86	53.98	5.12	AV
2390.0	26.55	33.90	V	60.45	73.98	13.53	PK
2390.0	12.21	33.90	V	46.11	53.98	7.87	AV
2483.5	34.99	33.99	Н	68.98	73.98	5.00	PK
2483.5	14.52	33.99	Н	48.51	53.98	5.47	AV
2483.5	25.51	33.99	V	59.50	73.98	14.48	PK
2483.5	11.77	33.99	V	45.76	53.98	8.22	AV

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

Frequency	Reading	AN.+CL	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	27.23	33.90	Н	61.13	73.98	12.85	PK
2390.0	13.45	33.90	Н	47.35	53.98	6.63	AV
2390.0	25.69	33.90	V	59.59	73.98	14.39	PK
2390.0	12.45	33.90	V	46.35	53.98	7.63	AV
2483.5	26.81	33.99	Н	60.80	73.98	13.18	PK
2483.5	14.17	33.99	Н	48.16	53.98	5.82	AV
2483.5	24.76	33.99	V	58.75	73.98	15.23	PK
2483.5	11.42	33.99	V	45.41	53.98	8.57	AV

Operation Mode:

Transfer Rate:

Operating Frequency

Channel No.

802.11n_20 MHz 6.5 Mbps 2412 MHz, 2462 MHz 01 Ch, 11 Ch

Frequency	Reading	AN.+CL	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	32.24	33.90	Н	66.14	73.98	7.84	PK
2390.0	15.53	33.90	Н	49.43	53.98	4.55	AV
2390.0	25.98	33.90	V	59.88	73.98	14.10	PK
2390.0	12.57	33.90	V	46.47	53.98	7.51	AV
2483.5	36.39	33.99	Н	70.38	73.98	3.60	PK
2483.5	14.23	33.99	Н	48.22	53.98	5.76	AV
2483.5	26.17	33.99	V	60.16	73.98	13.82	PK
2483.5	11.91	33.99	V	45.90	53.98	8.08	AV

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr			
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:			
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F			
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Operation Mode:	802.11n_40 MHz
Transfer Rate:	13.5 Mbps
Operating Frequency	2422 MHz, 2452 MHz
Channel No.	03 Ch, 09 Ch

Frequency	Reading dBuV	AN.+CL	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	ивиу	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	31.79	33.90	Н	65.69	73.98	8.29	PK
2390.0	14.94	33.90	Н	48.84	53.98	5.14	AV
2390.0	25.86	33.90	V	59.76	73.98	14.22	PK
2390.0	11.52	33.90	V	45.42	53.98	8.56	AV
2483.5	26.02	33.99	Н	60.01	73.98	13.97	PK
2483.5	12.59	33.99	Н	46.58	53.98	7.40	AV
2483.5	25.88	33.99	V	59.87	73.98	14.11	PK
2483.5	11.54	33.99	V	45.53	53.98	8.45	AV

1. Total = Reading Value + Antenna Factor + Cable Loss

- 2. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
- 3. 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. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP. Hotspot support	FCC ID: ZNFD213F
•	•		



8.7 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:

	Limits (dBµV)				
Frequency Range (MHz)	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.6 and 802.11b Because 802.11b mode is worst case.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F



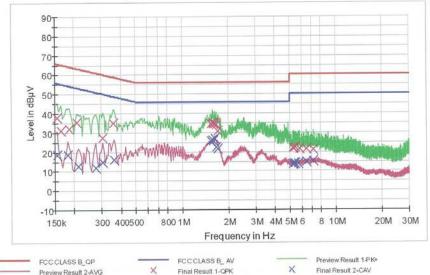
HCT TEST Report

Common Information

EUT: Manufacturer: Test Site: Operating Conditions: Operator Name:

LG-D213F LG SHIELD ROOM WLAN MODE KH-SEO

FCC CLASS B



Final Result 1

Preview Result 2-AVG

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	37.9	9.000	Off	N	9.7	27.9	65.8
0.163500	31.2	9,000	Off	N	9.7	34.1	65.3
0.186000	32.1	9.000	Off	N	9.7	32.1	64.2
0.208500	35.4	9.000	Off	N	9.7	27.9	63.3
0.307500	27.5	9.000	Off	N	9.7	32.5	60.0
0.357000	35.1	9.000	Off	N	9.7	23.7	58.8
1.553000	34.4	9.000	Off	N	9.8	21.6	56.0
1.575500	34.8	9.000	Off	N	9.8	21.2	56.0
1.602500	34.7	9.000	Off	N	9.8	21.3	56.0
1.629500	34.4	9.000	Off	N	9.8	21.6	56.0
1.665500	34.2	9.000	Off	N	9.8	21.8	56.0
1.701500	30.7	9.000	Off	N	9.8	25.3	56.0
5.265500	22.0	9.000	Off	N	10.1	38.0	60.0
5.301500	21.7	9.000	Off	N	10.1	38.3	60.0
5.441000	22.5	9.000	Off	N	10.1	37.5	60.0
5.805500	21.5	9.000	Off	N	10.2	38.5	60.0

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FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP. Hotspot support	FCC ID: ZNFD213F
	,		



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
6,462500	21.5	9.000	Off	N	10.2	38.5	60.0
7.115000	21.2	9.000	Off	N	10.3	38.8	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	18.5	9.000	Off	N	9.7	37.3	55.8
0.181500	18.4	9.000	Off	N	9.7	36.0	54.4
0.213000	12.9	9.000	Off	N	9.7	40.2	53.1
0.276000	11.7	9.000	Off	N	9.7	39.2	50.9
0.307500	14.6	9.000	Off	N	9.7	35.4	50.0
0.361500	16.0	9.000	Off	N	9.7	32.7	48.7
1.553000	25.7	9.000	Off	N	9.8	20.3	46.0
1.580000	26.0	9.000	Off	N	9.8	20.0	46.0
1.607000	25.7	9.000	Off	N	9.8	20.3	46.0
1.629500	27.0	9.000	Off	N	9.8	19.0	46.0
1.670000	22.4	9.000	Off	N	9.8	23.6	46.0
1.701500	21.7	9.000	Off	N	9.8	24.3	46.0
5.247500	13.5	9.000	Off	N	10.1	36.5	50.0
5.301500	13.8	9.000	Off	N	10.1	36.2	50.0
5.441000	13.9	9.000	Off	N	10.1	36.1	50.0
5.702000	13.9	9.000	Off	N	10.2	36.1	50.0
6.462500	14.7	9.000	Off	N	10.2	35.3	50.0
7.115000	15.3	9.000	Off	N	10.3	34.7	50.0

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FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
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HCT TEST Report

FCC CLASS B

Common Information

EUT: Manufacturer: Test Site: Operating Conditions: Operator Name: LG-D213F LG SHIELD ROOM WLAN MODE KH-SEO

907 80-70-60-Level in dBµV 50-40 30-20 10 0. -10 3M 4M 5M 6 8 10M 20M 30M 300 400500 8001M 2M 150k Frequency in Hz Preview Result 1-PK+ FCCCLASS B_ AV FCCCLASS B_QP

Final Result 1-QPK

X

Final Result 2-CAV

Final Result 1

Preview Result 2-AVG

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	44.3	9.000	Off	L1	9.7	21.0	65.3
0.199500	42.0	9.000	Off	L1	9.7	21.6	63.6
0.235500	40.2	9.000	Off	L1	9.7	22.1	62.3
0.361500	39.3	9.000	Off	L1	9.7	19.4	58.7
0.725000	38.8	9.000	Off	L1	9.7	17.2	56.0
0.887000	42.0	9.000	Off	L1	9.7	14.0	56.0
1.674500	41.5	9.000	Off	L1	9.8	14.5	56.0
1.688000	45.9	9.000	Off	L1	9.8	10.1	56.0
1.706000	42.1	9.000	Off	L1	9.8	13.9	56.0
1.719500	45.6	9.000	Off	L1	9.8	10.4	56.0
1.755500	43.7	9.000	Off	L1	9.8	12.3	56.0
1,796000	41.2	9.000	Off	L1	9.8	14.8	56.0
5.342000	27.6	9.000	Off	L1	10.1	32.4	60.0
5.436500	28.0	9.000	Off	L1	10.1	32.0	60.
5.670500	28.2	9.000	Off	L1	10.2	31.8	60.0
5.733500	28.4	9.000	Off	L1	10.2	31.6	60.

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6/5/2014

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Test Report No. Date of Issue: EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), FCC ID:	
HCT-R-1406-F042 June 20, 2014 VoIP, Hotspot support ZNFD213F	



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
6,368000	27.6	9.000	Off	L1	10.2	32.4	60.0
6.381500	27.8	9.000	Off	L1	10.2	32.2	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	25.3	9.000	Off	L1	9.7	30.0	55.3
0.199500	26.5	9.000	Off	L1	9.7	27.1	53.6
0.240000	21.9	9.000	Off	L1	9.7	30.2	52.1
0.361500	24.5	9.000	Off	L1	9.7	24.2	48.7
0,702500	24.9	9.000	Off	L1	9.7	21.1	46.0
0.900500	22.4	9.000	Off	L1	9.7	23.6	46.0
1.674500	31.6	9.000	Off	L1	9.8	14.4	46.0
1.683500	36.3	9.000	Off	L1	9.8	9.7	46.0
1.719500	35.4	9.000	Off	L1	9.8	10.6	46.0
1.737500	30.5	9.000	Off	L1	9.8	15.5	46.0
1.746500	33.2	9.000	Off	L1	9.8	12.8	46.0
1.755500	32.8	9.000	Off	L1	9.8	13.2	46.0
5.342000	17.9	9.000	Off	L1	10.1	32.1	50.0
5.517500	18.4	9.000	Off	L1	10.1	31.6	50.0
5,733500	17.9	9.000	Off	L1	10.2	32.1	50.0
5,792000	17.2	9.000	Off	L1	10.2	32.8	50.0
6.368000	18.7	9.000	Off	L1	10.2	31.3	50.0
6.381500	18.5	9.000	Off	L1	10.2	31.5	50.0

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FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40),	FCC ID:
HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F



9. LIST OF TEST EQUIPMENT 9.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	01/29/2014	Annual	01/29/2015	100073
Agilent	E4440A/ Spectrum Analyzer	04/09/2014	Annual	04/09/2015	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	05/23/2014	Annual	05/23/2015	MY51110063
Agilent	N1911A/Power Meter	01/24/2014	Annual	01/24/2015	MY45100523
Agilent	N1921A /POWER SENSOR	07/11/2013	Annual	07/11/2014	MY45241059
Hewlett Packard	11636B/Power Divider	10/22/2013	Annual	10/22/2014	11377
Agilent	87300B/Directional Coupler	12/18/2013	Annual	12/18/2014	3116A03621
Hewlett Packard	11667B / Power Splitter	01/27/2014	Annual	01/27/2015	10545
DIGITAL	EP-3010 /DC POWER SUPPLY	10/29/2013	Annual	10/29/2014	3110117
ITECH	IT6720 / DC POWER SUPPLY	11/05/2013	Annual	11/05/2014	0100021562870011 99
TESCOM	TC-3000C / BLUETOOTH TESTER	04/11/2014	Annual	04/11/2015	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	05/07/2014	Annual	05/07/2015	100422
Agilent	8493C / Attenuator(10 dB)	07/24/2013	Annual	07/24/2014	76649
WEINSCHEL	2-3 / Attenuator(3 dB)	10/28/2013	Annual	10/28/2014	BR0617

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HCT-R-1406-F042	June 20, 2014	VoIP, Hotspot support	ZNFD213F
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9.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration	Calibration	Calibration	Serial No.	
		Date	Interval	Due		
Schwarzbeck	VULB 9160/ TRILOG Antenna	12/17/2012	Biennial	12/17/2014 3150		
Rohde & Schwarz	ESCI / EMI TEST RECEIVER	01/24/2014	Annual	01/24/2015	100584	
HD	MA240/ Antenna Position Tower	N/A	N/A	N/A 556		
EMCO	1050/ Turn Table	N/A	N/A	N/A 114		
HD GmbH	HD 100/ Controller	N/A	N/A	N/A 13		
HD GmbH	KMS 560/ SlideBar	N/A	N/A	N/A 12		
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	09/10/2013	Annual	09/10/2014	10094	
CERNEX	CBL18265035 / POWER AMP	07/24/2013	Annual	07/24/2014	22966	
CERNEX	CBL26405040 / POWER AMP	04/04/2014	Annual	04/04/2015	19660	
Schwarzbeck	BBHA 9120D/ Horn Antenna	07/05/2013	Biennial	07/05/2015	1151	
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40	10/00/0010	Biennial	10/30/2014	BBHA9170124	
	GHz)	10/30/2012				
Rohde & Schwarz	FSP / Spectrum Analyzer	01/24/2014	Annual	01/24/2015	839117/011	
Wainwright		02/03/2014	Annual	02/03/2015	F6	
Instrument	WHF3.0/18G-10EF / High Pass Filter					
Wainwright		04/09/2014	Annual	04/09/2015	1	
Instrument	WHNX6.0/26.5G-6SS / High Pass Filter					
Wainwright	WUNVZ 0/100 000 / Useh Deep Filter	04/04/2014	Annual	04/04/2015	29	
Instrument	WHNX7.0/18G-8SS / High Pass Filter					
Wainwright	WRCJ2400/2483.5-2370/2520-60/14SS	06/24/2013	Annual	06/24/2014	1	
Instrument	/ Band Reject Filter					
TESCOM	TC-3000C / BLUETOOTH TESTER	04/11/2014	Annual	04/11/2015	3000C000276	
Rohde & Schwarz	CBT / BLUETOOTH TESTER	05/07/2014	Annual	05/07/2015	100422	
Rohde & Schwarz	LOOP ANTENNA	08/14/2012	Biennial	08/14/2014	100179	
CERNEX	CBL06185030 / POWER AMP	07/24/2013	Annual	07/24/2014	22965	
CERNEX	CBLU1183540 / POWER AMP	07/24/2013	Annual	07/24/2014	22964	

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCT-R-1406-F042	Date of Issue: June 20, 2014	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20&HT40), VoIP. Hotspot support	FCC ID: ZNFD213F
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