

# HCT CO., LTD.

# CERTIFICATE OF COMPLIANCE

**FCC Class II Permissive Change** 

**Applicant Name:** 

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

Address:

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue: May 22, 2014

Test Site/Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCT-R-1405-F023

HCT FRN: 0005866421

IC Recognition No.: 5944A-3

FCC ID

: ZNFV700

IC

: 2703C-V700

**APPLICANT** 

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

FCC/ IC Model(s):

LG-V700

Additional FCC/ IC Model(s):

LGV700, V700

**EUT Type:** 

2.4G/5G Dual WIFI Tablet

Frequency Range:

2402 MHz -2480 MHz(BT 4.0 Low Energy Mode)

Modulation type

**GFSK** 

FCC Classification:

Digital Transmission System(DTS)

FCC Rule Part(s):

Part 15.247

IC Rule:

RSS-210 Issue 8, RSS-GEN Issue 3

#### **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

Approved by

: Chang Seok Choi

Test engineer of RF Team Manager of RF Team

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FCC PT.15.247 TEST REPORT		FCC Class II Permissive Change REPORT		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



# **Version**

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1405-F023	May 22, 2014	- First Approval Report

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



# **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	6
7. SUMMARY TEST OF RESULTS	7
7.1 FCC Part	7
7.2 IC Part	7
8. TEST RESULT	8
8.1 RADIATED MEASUREMENT	8
8.1.1 RADIATED SPURIOUS EMISSIONS	8
8.1.2 RECEIVER SPURIOUS EMISSIONS 1	1 7
8.1.3 RADIATED RESTRICTED BAND EDGES 1	1 8
9. LIST OF TEST EQUIPMENT	2 0
9.1 LIST OF TEST EQUIPMENT(Radiated Test)	2 0

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



# 1. GENERAL INFORMATION

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

Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632

FCC ID: ZNFV700 IC: 2703C-V700

**EUT Type:** 2.4G/5G Dual WIFI Tablet

FCC/IC Model name(s): LG-V700

Additional FCC/IC Model name(s): LGV700, V700

April 25, 2014 ~ May 21, 2014 Date(s) of Tests:

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	2.4G/5G Dual WIFI Tablet
FCC/ IC Model Name	LG-V700
Additional FCC/ IC Model Name	LGV700, V700
Power Supply	DC 3.8 V
Battery type	Li-ion Battery(Standard)
Frequency Range	TX: 2402 MHz ~ 2480 MHz
	RX: 2402 MHz ~ 2480 MHz
BT Operating Mode	BT 4.0_Low Energy Mode
Modulation Type	GFSK
Number of Channels	40 Channels
Antenna Specification	Manufacturer: Ace Technology
	Antenna type: Planar Inverted F Antenna
	Peak Gain : 2.98 dBi

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



### 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.

FCC PT.15.247 TEST REPORT	FCC Class II Permissive Change REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



# 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."

## 6. ANTENNA REQUIREMENTS

## According to FCC 47 CFR §15.203, RSS-GEN 7.1.2

"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 directional gain of this E.U.T antenna does not exceed 6 dBi
- \* The E.U.T Complies with the requirement of §15.203, RSS-GEN 7.1.2

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



# 7. SUMMARY TEST OF RESULTS

# 7.1 FCC Part

Test Description	IC Part Section(s)	FCC Part Section(s)	Test Limit	Test Condition	Test Result
Radiated Spurious Emissions	RSS-210 [A8.5]	§15.205, 15.209	cf. Section 8.1.1	RADIATED	PASS
Radiated Restricted  Band Edge	RSS-210 [A8.5]	§15.247(d), 15.205, 15.209	cf. Section 8.1.3	RADIATED	PASS

# 7.2 IC Part

Test Description	IC Part Section(s)	FCC Part Section(s)	Test Limit	Test Condition	Test Result
Radiated Spurious Emissions	RSS-210 [A8.5]	§15.205, 15.209	cf. Section 8.1.1		PASS
Radiated Restricted  Band Edge	RSS-210 [A8.5]	§15.247(d), 15.205, 15.209	cf. Section 8.1.3	RADIATED	PASS
Receiver Spurious Emissions	RSS-GEN, Section 7.2.3	§15.109	cf. Section 8.1.2		PASS

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



# 8. TEST RESULT

# **8.1 RADIATED MEASUREMENT.**

# 8.1.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

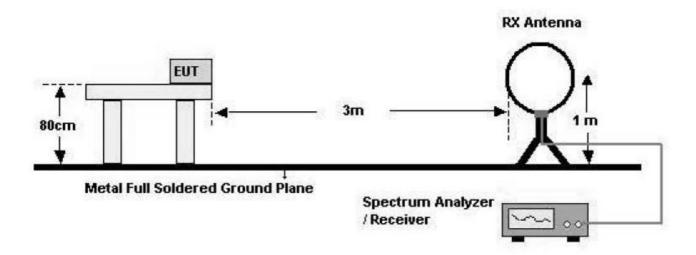
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

FCC PT.15.247 TEST REPORT		FCC Class II Permissive Change REPORT			
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:	
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700	

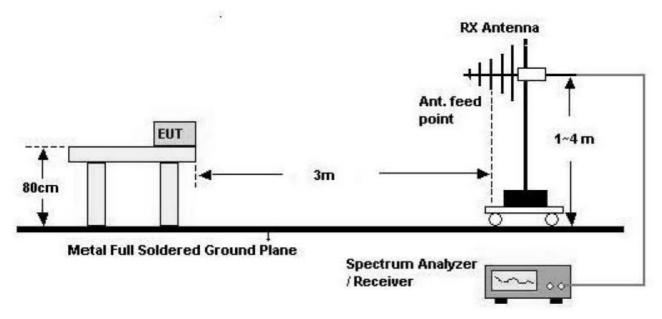


# **Test Configuration**

# **Below 30 MHz**



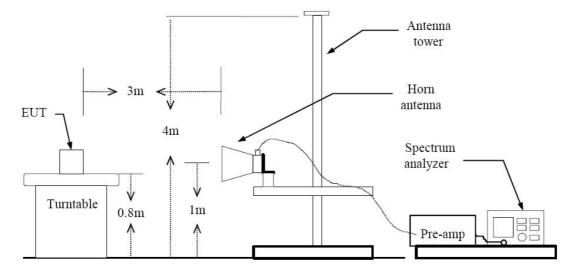
# 30 MHz - 1 GHz



FCC PT.15.247 TEST REPORT		FCC Class II Permissive Change REPORT	www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



#### **Above 1 GHz**



### **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 ≥  $3 \times RBW$ .

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 —RBW as a function of frequency

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

 
 FCC PT.15.247 TEST REPORT
 FCC Class II Permissive Change REPORT
 www.hct.co.kr

 Test Report No. HCT-R-1405-F023
 Date of Issue: May 22, 2014
 EUT Type: 2.4G/5G Dual WIFI Tablet
 FCC ID: ZNFV700
 IC: ZNFV700
 2703C-V700



#### - Average

Set RBW = 1 MHz

Set VBW ≥ 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.

- 1. We are performed the RSE and radiated band edge using standard radiated method.
- 2. The actual setting value of VBW for BT LE mode.

BT LE Mode	T <sub>on</sub>	T <sub>total</sub>	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
	0.3904	0.6240	62.56	2561	10000



## **TEST RESULTS**

## 9 kHz - 30MHz

**Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin	
MHz	dB <i>μ</i> V/m	dBm /m	dBm	(H/V)	dB <i>μ</i> V/m	dB <i>μ</i> V/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		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



## **TEST RESULTS**

# Below 1 GHz

**Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin	
MHz	dB <i>μ</i> V/m	dBm /m	dBm	(H/V)	dB <i>μ</i> V/m	dB <i>μ</i> V/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		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



#### Above 1 GHz

**Operation Mode:** CH Low(LE Mode)

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4804	49.24	-2.16	V	47.08	73.98	26.90	PK
4804	36.13	-2.16	V	33.97	53.98	20.01	AV
7206	46.45	7.31	V	53.76	73.98	20.22	PK
7206	32.76	7.31	V	40.07	53.98	13.91	AV
4804	49.49	-2.16	Н	47.33	73.98	26.65	PK
4804	36.81	-2.16	Н	34.65	53.98	19.33	AV
7206	46.87	7.31	Н	54.18	73.98	19.80	PK
7206	33.13	7.31	Н	40.44	53.98	13.54	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.
- 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 x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700



Operation Mode: CH Mid(LE Mode)

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4880	49.79	-1.87	V	47.92	73.98	26.06	PK
4880	36.01	-1.87	V	34.14	53.98	19.84	AV
7320	46.21	7.35	V	53.56	73.98	20.42	PK
7320	33.15	7.35	V	40.50	53.98	13.48	AV
4880	50.09	-1.87	Н	48.22	73.98	25.76	PK
4880	36.12	-1.87	Н	34.25	53.98	19.73	AV
7320	46.48	7.35	Н	53.83	73.98	20.15	PK
7320	33.54	7.35	Н	40.89	53.98	13.09	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.
- 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 x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC Class II Permissive Change REPORT				
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:		
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700		



**Operation Mode:** CH High(LE Mode)

Frequency	Reading	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4960	49.57	-1.84	V	47.73	73.98	26.25	PK
4960	36.52	-1.84	V	34.68	53.98	19.30	AV
7440	45.38	7.13	V	52.51	73.98	21.47	PK
7440	33.05	7.13	V	40.18	53.98	13.80	AV
4960	50.06	-1.84	Н	48.22	73.98	25.76	PK
4960	36.99	-1.84	Н	35.15	53.98	18.83	AV
7440	45.96	7.13	Н	53.09	73.98	20.89	PK
7440	33.20	7.13	Н	40.33	53.98	13.65	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.
- 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 x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC Class II Permissive Change REPORT				
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:		
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700		



## 8.1.2 RECEIVER SPURIOUS EMISSIONS

IC Rule(s) RSS-GEN

Test Requirements: Blow the table

Operating conditions: Under normal test conditions

Method of testing: Radiated

F < 1 GHz: RBW: 120 kHz, VBW: 300 kHz (Quasi Peak)

S/A. Settings:

F > 1 GHz: RBW: 1 MHz, VBW: 1 MHz (Peak)

Mode of operation: Receive

Frequency	Field Strength
(MHz)	(microvolts/m at 3 meters)
30 – 88	100
88 - 216	150
216 – 960	200
Above 960	500

# **Operation Mode: Receive:**

30 MHz ~ 1 GHz

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

## Above 1 GHz

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



#### **8.1.3 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	BT 4.0_LE
Operating Frequency	2402 MHz
Channel No	0 Ch

Frequency	Reading	A.F.+CL	Ant. Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	26.92	31.47	Н	58.39	73.98	15.59	PK
2390.0	14.46	31.47	Н	45.93	53.98	8.05	AV
2390.0	26.87	31.47	٧	58.33	73.98	15.65	PK
2390.0	14.27	31.47	٧	45.73	53.98	8.25	AV

- 1. Frequency range of measurement = 2310 MHz ~ 2390 MHz
- 2. Total = Reading Value + Antenna Factor + Cable Loss
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 4. The radiated restricted band edge measurements are measured with a spectrum analyzer connected to the receive antenna while the EUT is transmitting.

FCC PT.15.247 TEST REPORT		FCC Class II Permissive Change REPORT				
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:		
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700		



**Operation Mode** 

**Operating Frequency** 

Channel No

BT 4.0\_LE

2480 MHz

39 Ch

Frequency	Reading	A.F.+CL	Ant. Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
2483.5	27.16	31.46	Н	58.62	73.98	15.36	PK
2483.5	14.65	31.46	Н	46.11	53.98	7.87	AV
2483.5	27.05	31.46	V	58.51	73.98	15.47	PK
2483.5	14.49	31.46	V	45.95	53.98	8.03	AV

- 1. Frequency range of measurement = 2483.5 MHz ~ 2500 MHz
- 2. Total = Reading Value + Antenna Factor + Cable Loss
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 4. The radiated restricted band edge measurements are measured with a spectrum analyzer connected to the receive antenna while the EUT is transmitting.

FCC PT.15.247 TEST REPORT		FCC Class II Permissive Change REPORT			
Test Report No.	Date of Issue:	EUT Type: 2.4G/5G Dual WIFI Tablet	FCC ID:	IC:	
HCT-R-1405-F023	May 22, 2014		ZNFV700	2703C-V700	



# 9. LIST OF TEST EQUIPMENT

# 9.1 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration	Calibration	Calibration	Serial No.
Manufacturei	Model / Equipment	Date	Interval	Due	Serial No.
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 GHz)	10/30/2012	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	01/24/2014	Annual	01/24/2015	839117/011
Wainwright	WHF3.0/18G-10EF / High Pass Filter	02/02/2014	Annual	02/02/2015	EG
Instrument	WHF3.0/16G-10EF / HIGH FASS FIILEI	02/03/2014	Annuai	02/03/2015	F6
Wainwright	WHNX6.0/26.5G-6SS / High Pass Filter	04/09/2014	Annual	04/09/2015	1
Instrument	WHINAO.0/20.3G-033 / HIGH Pass Filler	04/09/2014	Ailliuai	04/09/2015	l
Wainwright	WHNX7.0/18G-8SS / High Pass Filter	04/04/2014	Annual	04/04/2015	29
Instrument	WITHAT.0/100-033 / Tright Fass Title	04/04/2014	Ailliuai	04/04/2013	29
Wainwright	WRCJ2400/2483.5-2370/2520-60/14SS /	06/24/2013	Annual	06/24/2014	1
Instrument	Band Reject Filter	00/24/2013	Ailliuai	00/24/2014	l
TESCOM	TC-3000C / BLUETOOTH TESTER	04/11/2014	Annual	04/11/2015	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	04/25/2014	Annual	04/25/2015	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 Class II Permissive Change REPORT			www.hct.co.kr
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