

# HCT CO., LTD.

# CERTIFICATE OF COMPLIANCE

#### **FCC Certification**

1 ...

Applicant Name:	Date of Issue:
Pantech Co., Ltd.	November 01, 2010
rancon oo., Eta.	Location:
Address:	HCT CO., LTD., 105-1,
Pantech Building, I-2, DMC, Sangam-dong, Mapo-gu,	Kyunggi-Do, Korea(Lab)
Seoul, Korea(ZIP: 121-792)	Test Report No.: HC

Location: HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea(Lab) Test Report No.: HCTR1011FR02 HCT FRN: 0005866421

IC Recognition No.: 5944A-2

# FCC ID :JYCTOW APPLICANT :Pantech Co., Ltd.

FCC Model(s):	1X18035PP
Additional Model(s):	TXT8035, TXT8035US
EUT Type:	Cellular PCS/ CDMA with Bluetooth Phone
Max. RF Output Power:	4.80 dBm(3.02 mW)
Frequency Range:	2402 - 2480 MHz (Bluetooth)
Modulation type	GFSK(Normal), PSK(EDR)
FCC Classification:	FCC Part 15 Frequency Hopping Spread Spectrum Transceiver
FCC Rule Part(s):	Part 15 subpart C 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)

e e 6ho

Report prepared by : Jong Seok Lee Test Engineer of RF Team

Approved by : Sang Jun Lee Manager of RF Team

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FCC PT.15.247 TEST REPORT	8	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 1 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



# <u>Version</u>

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1011FR02	November 01, 2010	First Approval Report

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 2 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



# **Table of Contents**

1.	GENER		. 4
2.	EUT DES	SCRIPTION	. 4
3.	TEST M	ETHODOLOGY	. 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.	INSTRU	MENT CALIBRATION	. 6
5.	FACILIT	ES AND ACCREDITATIONS	. 6
	5.1	FACILITIES	-
	5.2	EQUIPMENT	. 6
6.	ANTENN	A REQUIREMENTS	. 6
7.	SUMMA	RY OF TEST RESULTS	. 7
8.	FCC PA	RT 15.247 REQUIREMENTS	-
	8.1	PEAK POWER	. 8
	8.2	BAND EDGES MEASUREMENT	12
	8.3	FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (99% BW)	15
	8.4	NUMBER OF HOPPING FREQUENCY	20
	8.5	TIME OF OCCUPANCY (DWELL TIME)	23
	8.6	SPURIOUS EMISSIONS	27
	8.6.1	CONDUCTED SPURIOUS MEASUREMENT	27
	8.6.2	RADIATED SPURIOUS EMISSIONS	34
	8.6.3	RADIATED RESTRICTED BAND EDGE MEASUREMENTS	42
	8.7	POWERLINE CONDUCTED EMISSIONS	43
9.	LIST OF	TEST EQUIPMENT	48

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 3 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



#### 1. GENERAL INFORMATION

Applicant Name:	Pantech Co., Ltd.
Address:	Pantech Building, I-2, DMC, Sangam-dong, Mapo-gu, Seoul, Korea(ZIP: 121-792)
FCC ID:	JYCTOW
EUT:	Cellular PCS/ CDMA with Bluetooth Phone
Model name(s):	TXT8035PP
Additional Model name(s):	TXT8035, TXT8035US
Date(s) of Tests:	October 25, 2010 ~ November 01, 2010
Contact Person:	Name: Bong Gu Lee
	Phone #: +82-2-2030-1242
Place of Tests:	Fax #: +82-2-2030-2520 HCT Co., Ltd. Icheon-si, Kyunggi-Do, Korea(Lab) (IC Recognition No. : 5944A-2)

#### 2. EUT DESCRIPTION

Product	Cellular PCS/ CDMA with Bluetooth Phone
FCC Model Name	TXT8035PP
FCC Additional Model(s)	TXT8035, TXT8035US
Power Supply	DC 3.7 V
Battery Type	Li-ion Battery(Standard)
Frequency Range	2402 - 2480 MHz (Bluetooth)
Transmit Power	4.80 dBm(3.02 mW)
Modulation Type	GFSK(Normal), PSK(EDR)
Modulation Technique	FHSS
Number of Channels	79Channels
Antenna Specification	Manufacturer: HIROSE KOREA CO., LTD.
	Antenna type: Chip Antenna
	Peak Gain : 1.4 dBi

#### **\* 15.247 Requirements for Bluetooth transmitter**

• This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:

- 1) This system is hopping pseudorandomly.
- 2) Each frequency is used equally on the average by each transmitter.
- 3) The receiver input bandwidths that match the hopping channel bandwidths of their corresponding transmitters
- 4) The receiver shifts frequencies in synchronization with the transmitted signals.

• 15.247(g): The system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this Section 15.247 should the transmitter be presented with a continuous data (or information) stream.

• 15.247(h): The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 4 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



# 3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz(ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" were used in the measurement of the **Pantech Co., Ltd.** 

Cellular PCS/ CDMA with Bluetooth Phone FCC ID: JYCTOW

#### **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)

#### 3.4 DESCRIPTION OF TEST MODES

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

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

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 5 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



### 4. INSTRUMENT CALIBRATION

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

# 5. FACILITIES AND ACCREDITATIONS

#### 5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 10, 2009 (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:

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

\* The antennas of this E.U.T are permanently attached.

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

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 6 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



# 7. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
20 dB Bandwidth	§15.247(a)(1)(ii) or (iii)	NA		PASS
Occupied Bandwidth		NA		PASS
Conducted Maximum Peak Output Power	§15.247(b)(1)	< 1 Watts		PASS
Carrier Frequency Separation	§15.247(a)(1)	>25 kHz or >2/3 of the 20dB BW		PASS
Number of Hopping Frequencies	§15.247(a)(1)(iii)	>15	CONDUCTED	PASS
Time of Occupancy	§15.247(a)(1)(iii)	<400 ms		PASS
Conducted Spurious Emissions	§15.247(d)	< 20 dB for all out-of band emissions		PASS
Band Edge(Out of Band Emissions)	§15.247(d)	< 20 dB for all out-of band emissions		PASS
AC Power line Conducted Emissions	§15.207(a)	cf. Section 8.7		PASS
Radiated Spurious Emissions	§15.247(d), 15.205, 15.209	cf. Section 8.6.2	RADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.6.3	RADIATED	PASS

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT							
Test Report No. HCTR1011FR02	Date of Issue: November 01, 2010								



# 8. FCC PART 15.247 REQUIREMENTS

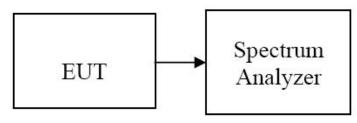
#### 8.1 PEAK POWER

#### LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

- 1. For systems using digital modulation in the bands of 902 ~ 928 MHz, 2400 ~ 2483.5 MHz, and 5725 ~ 5850 MHz: 1 watt.
- 2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **Test Configuration**



#### **TEST PROCEDURE**

The transmitter output is connected to the Spectrum Analyzer. The Spectrum Analyzer is set to the peak detector mode.

- 1. Span = 2 MHz (GFSK) / 5 MHz (8DPSK)
- 2. RBW = 1 MHz (GFSK) / 3 MHz (8DPSK)
- 3. VBW = 1 MHz (GFSK) / 3 MHz (8DPSK)
- 4. Sweep = auto
- 5. Packet type= DH5 (GFSK) / 3-DH5 (8DPSK)

#### **TEST RESULTS**

No non-compliance noted

#### **Test Data**

Channel	Frequency	Output Pov	wer(GFSK)	Output Pov	ver(8DPSK)	Limit	Result
Channel	(MHz)	(dBm)	(dBm) (mW)		(mW)	(W)	Result
Low	2402	2.48	1.77	4.80	3.02		PASS
Mid	2441	2.34	1.71	4.72	2.96	1	PASS
High	2480	2.06	1.61	4.40	2.75		PASS

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr			
Test Report No. HCTR1011FR02	Date of Issue: November 01, 2010						



Test Plots (GFSK) Peak Power (Low-CH)

🔆 Agilen	it								RΤ	•	Freq/Channel
Ref 10 dB #Peak	EST Powe 3m	r Out Ch Atten					Mkr1	2.401 2.	807 G 48 dB		Center Freq 2.40200000 GHz
Log 10 dB/ Offst				,						-	<b>Start Freq</b> 2.40100000 GHz
8 dB											<b>Stop Freq</b> 2.40300000 GHz
LgAv											<b>CF Step</b> 200.000000 kHz <u>Auto</u> Man
M1 S2 S3 FC AA											Freq Offset 0.00000000 Hz
£(f): FTun Swp											<b>Signal Track</b> On <u>Off</u>
Center 2.4 #Res BW 1		Hz	#V[	3W 1 M	Hz	Sw	veep 1	Spai . ms (6	n 2 MH 01 pt:		
File Oper	ation Sta	itus, C:	\HCT.GI	IF file	saved						

#### Test Plots (GFSK) Peak Power (Mid-CH)

🔆 Agil	lent								F	: T	Freq/Channel
FCC BT Ref 10		Power		.39 20 dB				Mkr1	2.440 8 2.3	27 GHz 4 dBm	Center Freq 2.44100000 GHz
#Peak Log					1 \$						2.11100000 0112
10 dB/ Offst											<b>Start Freq</b> 2.44000000 GHz
8 dB											<b>Stop Freq</b> 2.44200000 GHz
LgAv											<b>CF Step</b> 200.000000 kHz <u>Auto</u> Man
M1 S2 S3 FC AA											FreqOffset 0.00000000 Hz
€(f): FTun Swp											<b>Signal Track</b> On <u>Off</u>
Center #Res Bk			lz	#V	BW 1 M	IHz	S	weep 1	Span ms (60	2 MHz 1 pts)	
File Op	eratio	n Stat	us, C:	\HCT.G	IF file	saved					

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT						
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 9 of 48				
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW					



Test Plots (GFSK) Peak Power (High-CH)

🔆 Agilen	nt								R	Т	Freq/Channel
Ref 10 dE		wer Out Cl Atten	n.78 20 dB				Mkr1	2.480 2.		GHz dBm	Center Freq 2.48000000 GHz
#Peak Log											2.40000000 0112
10 dB/ Offst										_	<b>Start Freq</b> 2.47900000 GHz
dB											<b>Stop Freq</b> 2.48100000 GHz
LgAv											<b>CF Step</b> 200.000000 kHz <u>Auto</u> Man
M1 S2 S3 FC AA											FreqOffset 0.00000000 Hz
£(f): FTun Swp											<b>Signal Track</b> On <u>Off</u>
Center 2. #Res BW 1		) GHz	#V	BW 1 M	Hz	s	weep 1	Spa . ms (6		MHz pts)	
		Status, C:	\HCT.G	IF file	saved						

#### Test Plots (8DPSK) Peak Power (Low-CH)

🔆 Agilent				RT	Freq/Channel
FCC BT TEST Power Ref 10 dBm #Peak	Out Ch.0 Atten 20 dB		Mkr1 (	2.401 933 GHz 4.80 dBm	Center Freq 2.40200000 GHz
Log 10 dB/ Offst		1			<b>Start Freq</b> 2.39950000 GHz
8 dB					<b>Stop Freq</b> 2.40450000 GHz
LgAv					<b>CF Step</b> 500.000000 kHz <u>Auto</u> Man
M1 S2 S3 FC AA					FreqOffset 0.00000000 Hz
£(f): FTun Swp					<b>Signal Track</b> On <u>Off</u>
Center 2.402 000 G #Res BW 3 MHz File Operation Sta	#\	BW 3 MHz		Span 5 MHz ms (601 pts)	
	tudy of the fite				

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT						
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 10 of 48				
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW					



Test Plots (8DPSK) Peak Power (Mid-CH)

🔆 Ag	jilent							F	₹ T	Freq/Channel
Ref 10 #Peak			Out Ch Atten		\$		Mkr1	2.440 8 4.7	75 GHz 2 dBm	Center Freq 2.44100000 GHz
Log 10 dB/ Offst					1					Start Freq 2.43850000 GHz
8 dB										<b>Stop Freq</b> 2.44350000 GHz
LgAv										<b>CF Step</b> 500.000000 kHz <u>Auto</u> Man
M1 S2 S3 FC AA	L									FreqOffset 0.00000000 Hz
€(f): FTun Swp										<b>Signal Track</b> On <u>Off</u>
#Res B	0.441 ₩ 3 MH	z			BW 3 M		veep 1	Span ms (60	5 MHz 1 pts)	
File 0	peratio	n Stat	tus, C:	\HCT.6	IF file	saved				

#### Test Plots (8DPSK) Peak Power (High-CH)

🔆 Ag	jilent						F	₹ T	Freq/Channel
FCC B Ref 10 #Peak	T TEST dBm	Power	1.78 20 dB			Mkr1	2.479 8 4.4	75 GHz 0 dBm	Center Freq 2.48000000 GHz
Log 10 dB/			 `	\$1					<b>Start Freq</b> 2.47750000 GHz
Offst 8 dB									<b>Stop Freq</b> 2.48250000 GHz
LgAv									<b>CF Step</b> 500.000000 kHz <u>Auto</u> Man
M1 S2 S3 FC AA									FreqOffset 0.00000000 Hz
£(f): F⊤un Swp									<b>Signal Track</b> On <u>Off</u>
#Res B	L 2.480 3W 3 MH	z	#V +V	BW 3 M IF file		weep 1	Span . ms (60	5 MHz 1 pts)	

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 11 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	

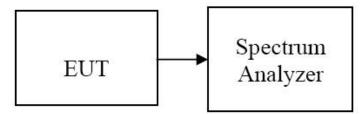


#### 8.2 BAND EDGES MEASUREMENT

#### LIMIT

According to §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.

#### **Test Configuration**



#### **TEST PROCEDURE**

The spectrum analyzer is set to :

- 1. Span = 8 MHz
- 2. RBW = 100 kHz
- 3. VBW = 300 kHz
- 4. Sweep = auto
- 5. Detector Mode = Peak

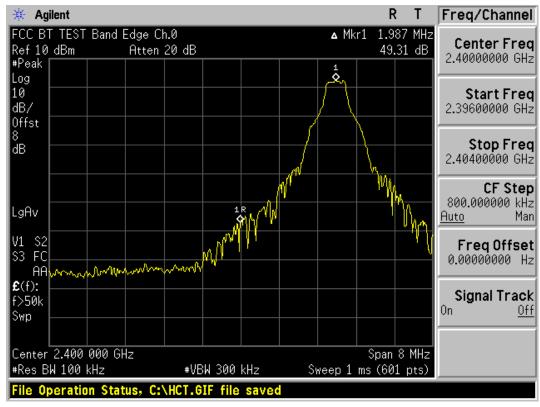
#### **TEST RESULTS**

See attached.

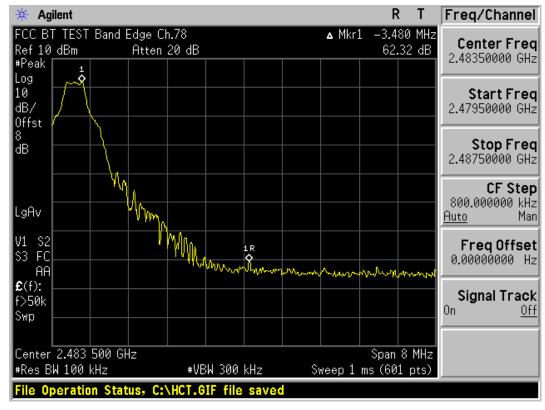
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 12 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK) Band Edges (Low-CH)



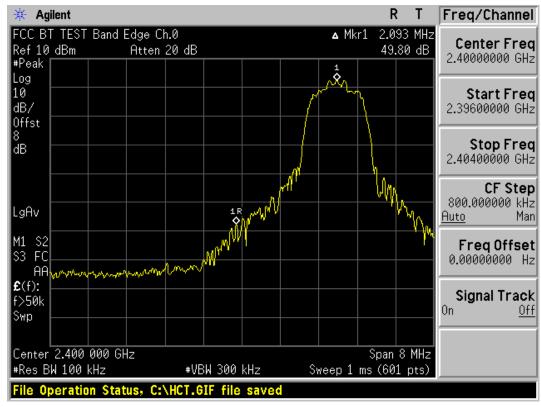
#### Test Plots (GFSK) Band Edges (High-CH)



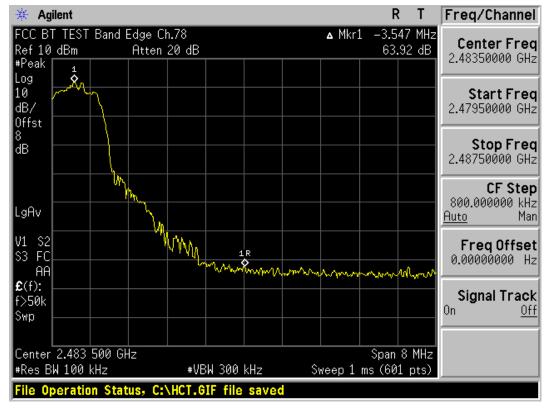
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 13 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (8DPSK) Band Edges (Low-CH)



#### Test Plots (8DPSK) Band Edges (High-CH)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 14 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	

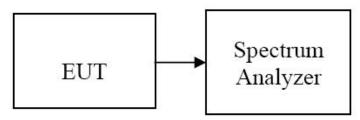


# 8.3 FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (99% BW)

#### LIMIT

According to §15.247(a)(1), Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

#### **Test Configuration**



#### TEST PROCEDURE

The spectrum analyzer is set to :

- 1. Span = 3 MHz
- 2. RBW = 30 kHz
- 3. VBW = 100 kHz
- 4. Sweep = auto

The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

#### **TEST RESULTS**

No non-compliance noted

#### **Test Data**

Channel Separation (kHz)		20dB Bandwidth (kHz)			Limit	Result
GFSK	8DPSK	Channel	GFSK	8DPSK	(kHz)	
		Low CH	950.0	1295.0	>25 or	
995	840	Middle CH	949.1	1276.0	>2/3 of the	Pass
		High CH	950.4	1296.0	20dB BW	

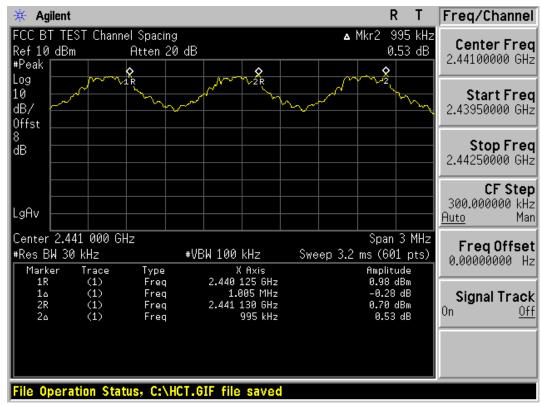
#### Occupied Bandwidth (99% BW )

Channel	GFSK	8DPSK	Result
Low CH	907.6	1178.6	
Middle CH	909.0	1165.4	Pass
High CH	910.9	1179.3	

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 15 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



#### Test Plots (GFSK) Channel Separation



#### Test Plots (8DPSK) Channel Separation

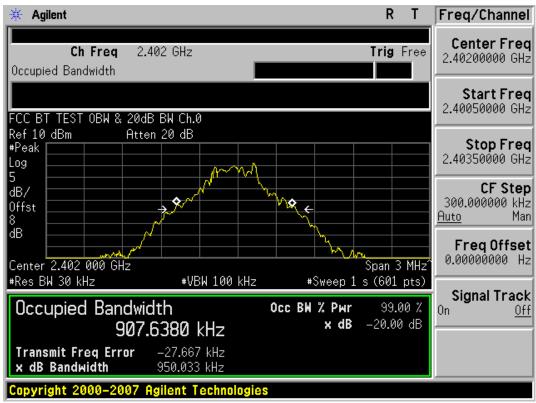
🔆 Agilent				RT	Freq/Channel
FCC BT TEST Chann Ref 10 dBm #Peak Log 10 dB/ Offst	el Spacing Atten 20 dB	× 2R	▲ Mkrź	2 840 k -0.67 d	Contor Lrog
dB					Stop Freq 2.44250000 GHz
LgAv					<b>CF Step</b> 300.000000 kHz <u>Auto</u> Man
Center 2.441 000 G #Res BW 30 kHz Marker Trace		BW 100 kHz X Axis	Sweep 3.2 ms	pan 3 Mł (601 pt: plitude	
$ \begin{array}{cccc} 1R & (1) \\ 1_{\Delta} & (1) \\ 2R & (1) \\ 2_{\Delta} & (1) \end{array} $	Freq Freq Freq Freq	2.439 965 GHz 1.160 MHz 2.441 125 GHz 840 kHz	( 0.	.05 dBm 0.87 dB .93 dBm 0.67 dB	Signal Track On <u>Off</u>
File Operation Sta	tus, C:\HCT.(	GIF file saved			

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 16 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (Low-CH)



#### Test Plots (GFSK)

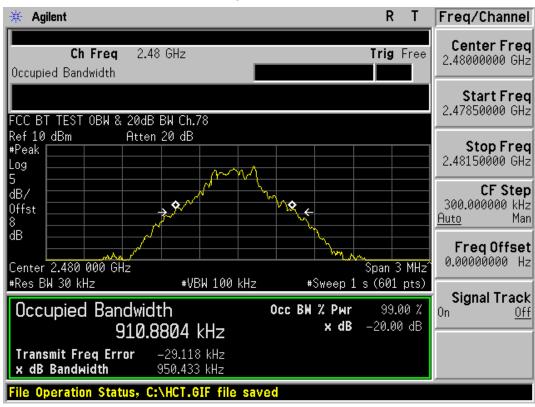
20 dB Bandwidth & Occupied Bandwidth (Mid-CH)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 17 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	

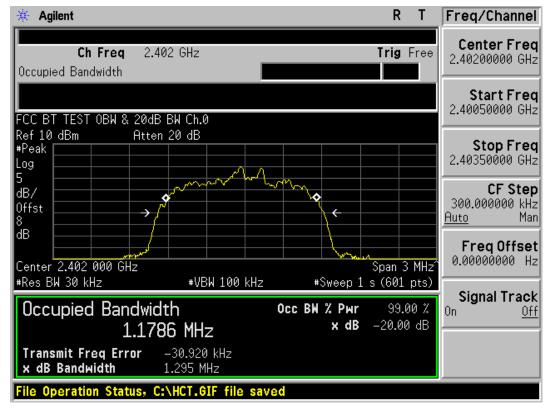


Test Plots (GFSK) 20 dB Bandwidth & Occupied Bandwidth (High-CH)



#### Test Plots (8DPSK)

20 dB Bandwidth & Occupied Bandwidth (Low-CH)

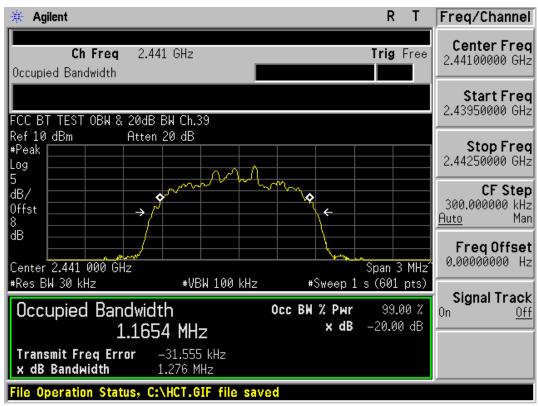


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 18 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



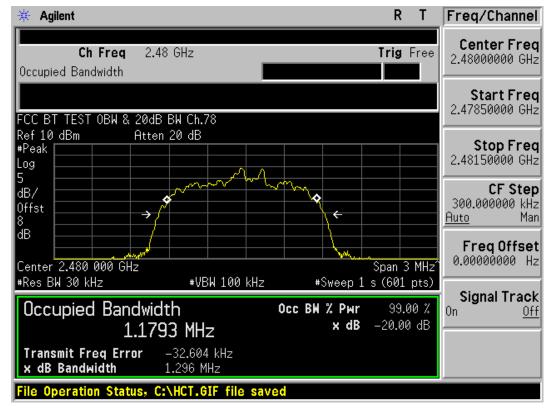
Test Plots (8DPSK)

20 dB Bandwidth & Occupied Bandwidth (Mid-CH)



#### Test Plots (8DPSK)

20 dB Bandwidth & Occupied Bandwidth (High-CH)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 19 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	

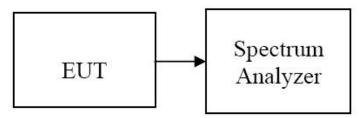


#### 8.4 NUMBER OF HOPPING FREQUENCY

#### LIMIT

According to 15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5 MHz bands shall use at least 15 hopping frequencies.

#### Test Configuration



#### **TEST PROCEDURE**

The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer was set to :

- 1. Span = the frequency band of operation (Start = 2400 MHz, Stop = 2483.5 MHz)
- 2. RBW = 300 kHz
- 3. VBW = 300 kHz
- 4. Sweep = auto

The trace was allowed to stabilize.

#### **TEST RESULTS**

No non-compliance noted

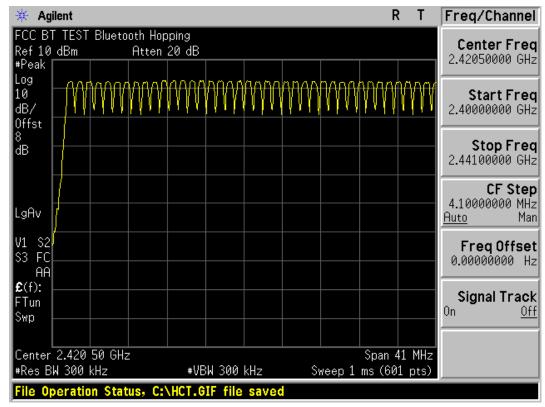
#### **Test Data**

Result (N	lo. of CH)	1	Decult
GFSK	8DPSK	Limit	Result
79	79	>15	Pass

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 20 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	

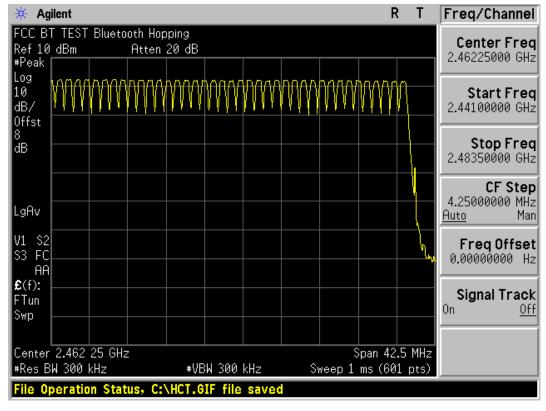


Test Plots (GFSK) Number of Channels (2.4 GHz - 2.441 GHz)



# Test Plots (GFSK)

Number of Channels (2.441 GHz - 2.4835 GHz)

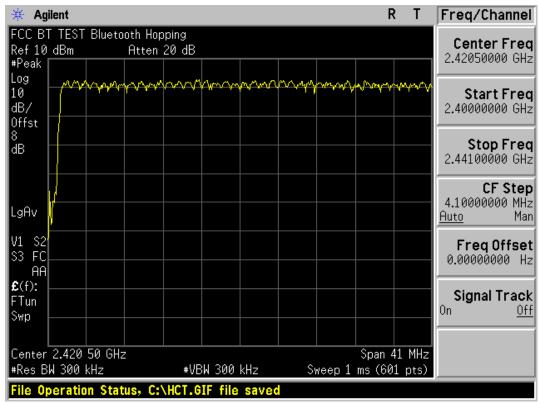


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 21 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



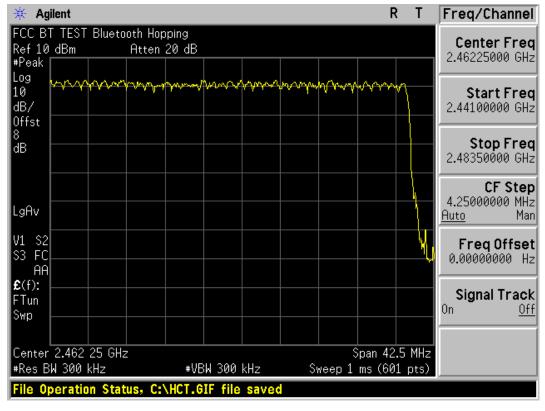
Test Plots (8DPSK)

Number of Channels (2.4 GHz - 2.441 GHz)



# Test Plots (8DPSK)

Number of Channels (2.441 GHz - 2.4835 GHz)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 22 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	

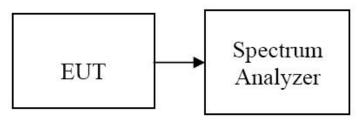


#### 8.5 TIME OF OCCUPANCY (DWELL TIME)

#### LIMIT

According to \$15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

#### **Test Configuration**



#### **TEST PROCEDURE**

EUT was set to transmit the longest packet type (DH5)

- 1. Span = zero span
- 2. RBW = 1 MHz
- 3. VBW = 1 MHz
- 4. Sweep = as necessary to capture the entire dwell time per channel

The marker-delta function was used to determine the dwell time.

#### **TEST RESULTS**

See the table.

DH 5(The longest packet type for GFSK)

CH Mid : 2.89 \* (1600/6)/79 \* 31.6 = 308.27 (ms) 3-DH 5(The longest packet type for 8DPSK)

CH Mid : 2.90 \* (1600/6)/79 \* 31.6 = 309.33 (ms)

Channel	Pulse Time (ms)		Total of Dwell (ms)		Period Time	Limit	Result
Channer	GFSK	8DPSK	GFSK	8DPSK	(s)	(ms)	Nesuit
Low	2.89	2.90	308.27	309.33	31.6		PASS
Mid	2.89	2.90	308.27	309.33	31.6	400	PASS
High	2.89	2.90	308.27	309.33	31.6		PASS

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 23 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK) Dwell Time (Low-CH)



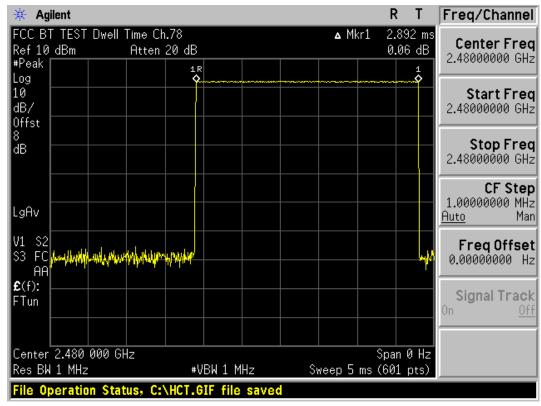
#### Test Plots (GFSK) Dwell Time (Mid-CH)

🔆 Agilent		RT	Freq/Channel
FCC BT TEST Dwell Time Ch Ref 10 dBm Atten		∆ Mkr1 2.892 0.07 d	
#Peak 1R Log <b>\$</b>			
10 dB/ 0ffst			Start Freq 2.44100000 GHz
dB			<b>Stop Freq</b> 2.44100000 GHz
LgAv			<b>CF Step</b> 1.00000000 MHz <u>Auto</u> Man
V1 S2 S3 FC <mark>адардания — — — — — — — — — — — — — — — — — — —</mark>		Ang the physical and the states of the state	Freq Offset
<b>£</b> (f): FTun			Signal Track
Center 2.441 000 GHz		Span 0 H	
Res BW 1 MHz	₩VBW 1 MHz	Sweep 5 ms (601 pt:	5/
File Operation Status, C:	HCT.GIF file saved		

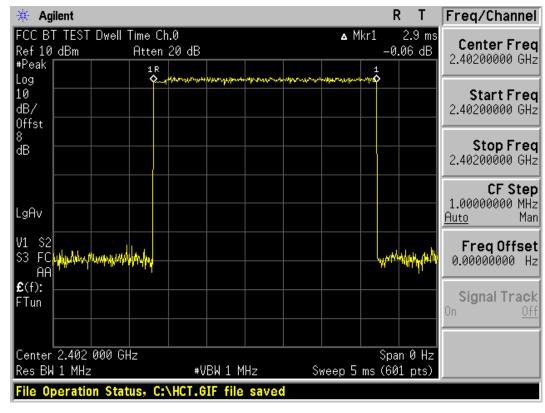
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 24 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK) Dwell Time (High-CH)



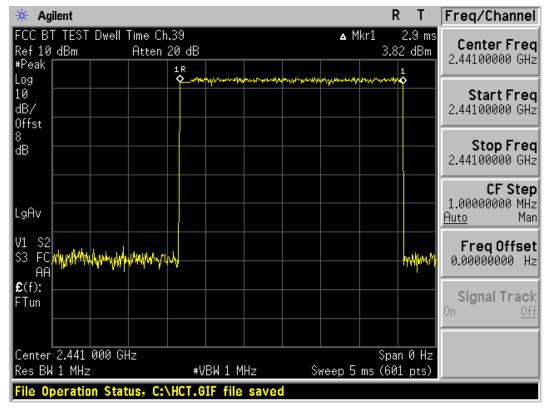
#### Test Plots (8DPSK) Dwell Time (Low-CH)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 25 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (8DPSK) Dwell Time (Mid-CH)



#### Test Plots (8DPSK) Dwell Time (High-CH)

🔆 Agilent		F	? T [	Freq/Channel
#Paak	Ch.78 n 20 dB	▲ Mkr1 -0.	2.9 ms .18 dB	Center Freq 2.48000000 GHz
	nogen geschielten gegenen der die geschielten geschielten der soller die geschielten die geschielten die geschie In die geschielten die geschielten die geschielten die geschielten die geschielten die geschielten die geschielt	No congranity in a function if the		<b>Start Frec</b> 2.48000000 GHz
dB				<b>Stop Fred</b> 2.48000000 GHz
LgAv				<b>CF Step</b> 1.00000000 MHz <u>Auto</u> Mar
V1 S2 S3 FC MAMAMANANANANANANANANANANANANANANANANAN		wenty	ulleur Alter	Freq Offse 0.00000000 Ha
£(f): FTun				<b>Signal Track</b> In <u>Of</u> i
Center 2.480 000 GHz Res BW 1 MHz	#VBW 1 MHz	Spa Sweep 5 ms (60	n 0 Hz 1 pts)	
File Operation Status, C	:\HCT.GIF file save	ed and a second s		

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 26 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



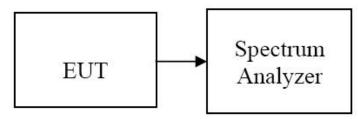
#### 8.6 SPURIOUS EMISSIONS

#### 8.6.1 CONDUCTED SPURIOUS MEASUREMENT

#### 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. 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 15.209(a) (see Section 15.205(c)).

#### **Test Configuration**



#### **TEST PROCEDURE**

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz. Detector Mode is set to a peak detector Mode.

Measurements are made over the 30 MHz to 26 GHz range with the transmitter set to the lowest, middle, and highest channels.

#### TEST RESULTS

No non-compliance noted

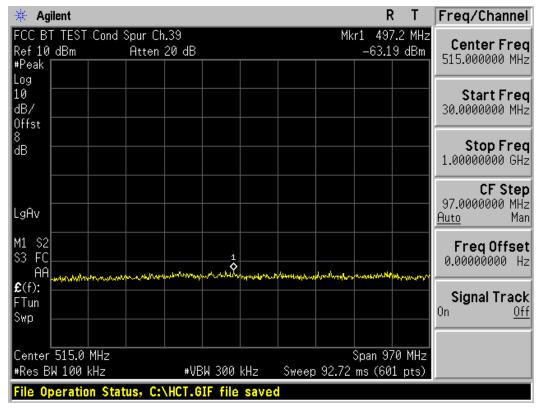
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 27 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz) Spurious Emission (Low-CH)

* Agilent	RT	Freq/Channel
FCC BT TEST Cond Spur Ch.0 Ref 10 dBm Atten 20 dB #Peak	Mkr1 731.6 MHz -62.60 dBm	Center Freq 515.000000 MHz
Log 10 dB/ Offst		Start Freq 30.0000000 MHz
8 dB		<b>Stop Freq</b> 1.00000000 GHz
LgAv		<b>CF Step</b> 97.0000000 MHz <u>Auto</u> Man
M1 S2 S3 FC AA	ntree and a state of the state	FreqOffset 0.00000000 Hz
€(f): FTun Swp		<b>Signal Track</b> On <u>Off</u>
Center 515.0 MHz #Res BW 100 kHz #VBW 300 kHz	Span 970 MHz Sweep 92.72 ms (601 pts)	
File Operation Status, C:\HCT.GIF file saved		

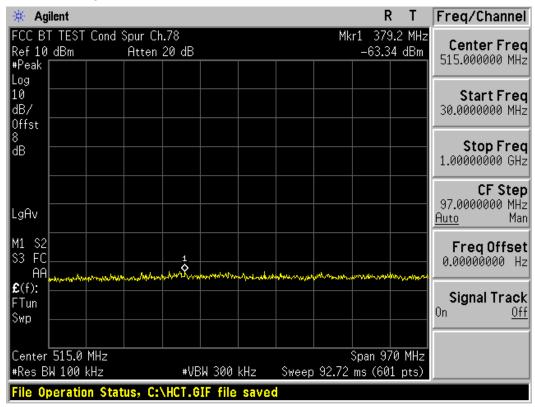
Test Plots (GFSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz) Spurious Emission (Mid-CH)



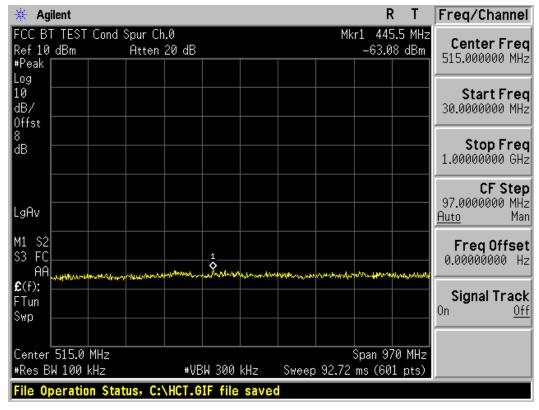
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 28 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz) Spurious Emission (High-CH)



Test Plots (8DPSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz) Spurious Emission (Low-CH)



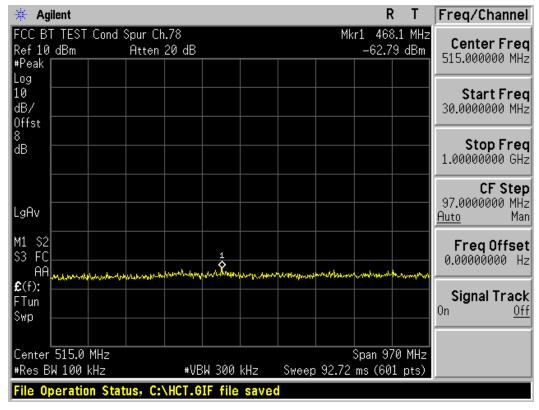
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 29 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (8DPSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz) Spurious Emission (Mid-CH)

🔆 Agilent		R	T Freq/Channel
#Peak	h.39 20 dB		7.9 MHz 5 dBm 515.000000 MHz
Log 10 dB/ Offst			Start Freq 30.0000000 MHz
8 dB			Stop Freq 1.00000000 GHz
LgAv			<b>CF Step</b> 97.0000000 MHz <u>Auto</u> Man
M1 S2 S3 FC AA	A STATION AND AND A STATION OF A		Freq Offset 0.00000000 Hz
£(f): FTun Swp			Signal Track On <u>Off</u>
Center 515.0 MHz #Res BW 100 kHz	#VBW 300 kHz	Span 97 Sweep 92.72 ms (60	
File Operation Status, C:	\HCT.GIF file save	d	_

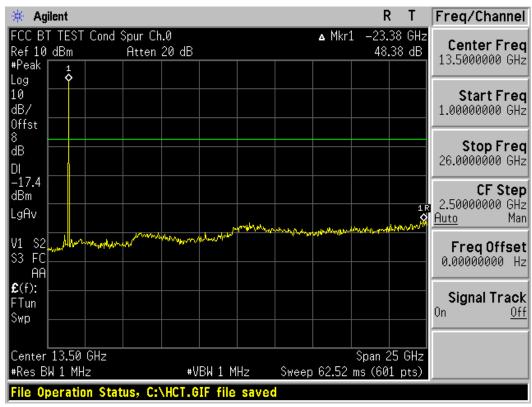
Test Plots (8DPSK) - 30 MHz - 1 GHz (RBW:100 kHz, VBW: 300 kHz) Spurious Emission (High-CH)



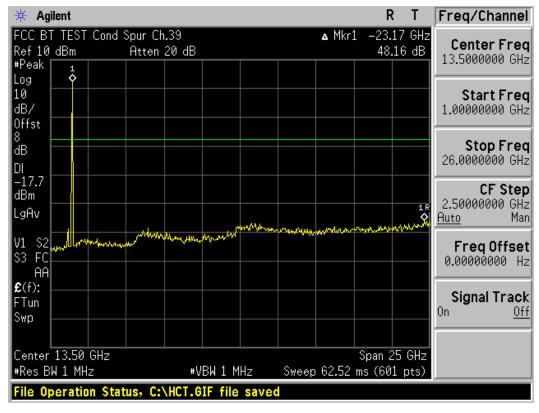
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 30 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz) Spurious Emission (Low-CH)



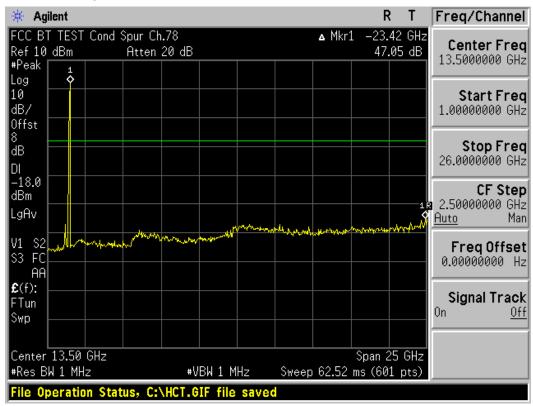
Test Plots (GFSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz) Spurious Emission (Mid-CH)



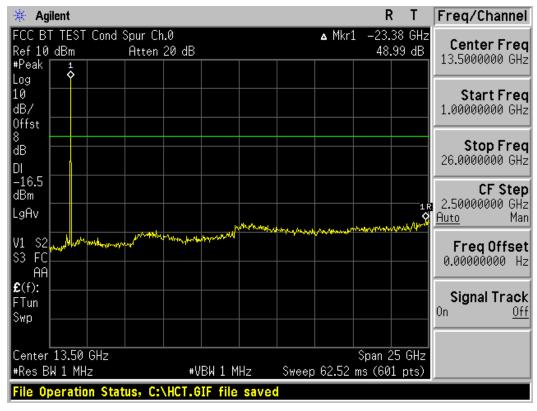
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 31 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (GFSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz) Spurious Emission (High-CH)



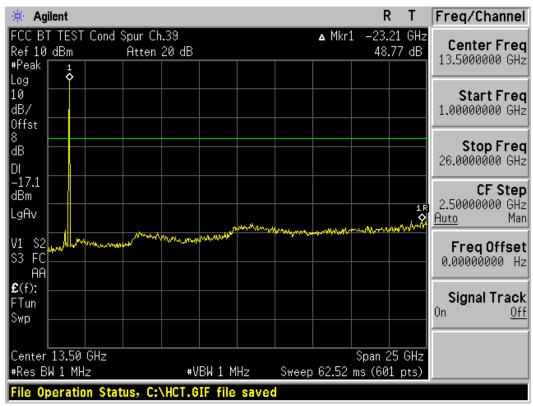
Test Plots (8DPSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz) Spurious Emission (Low-CH)



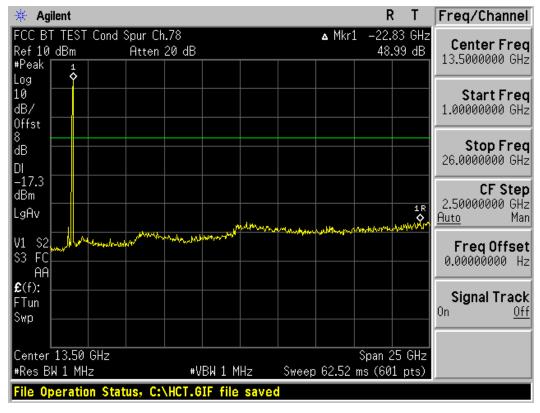
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 32 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Test Plots (8DPSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz) Spurious Emission (Mid-CH)



#### Test Plots (8DPSK) - 1 GHz - 26 GHz (RBW:1 MHz, VBW: 1 MHz) Spurious Emission (High-CH)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 33 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



#### 8.6.2 RADIATED SPURIOUS EMISSIONS

#### LIMIT : §15.247(d), §15.205, §15.209

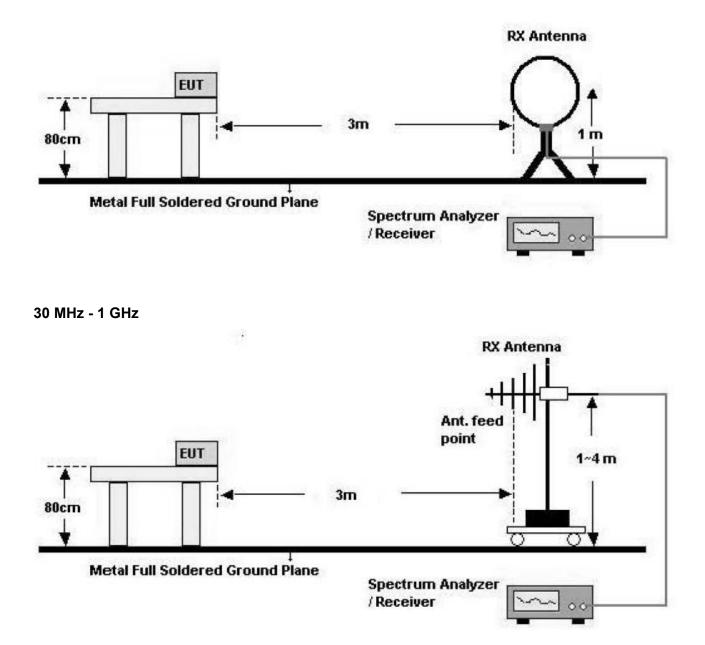
1. 20dBc in any 100kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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 CERTIFICATION REPORT	FCC CERTIFICATION REPORT	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 34 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



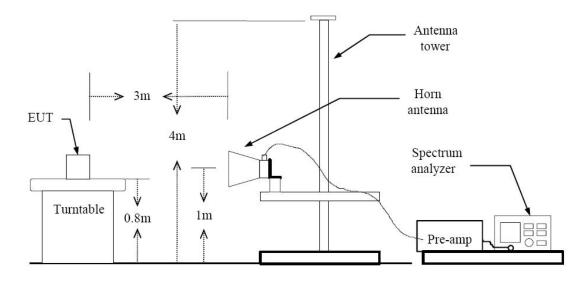
#### Below 30 MHz



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 35 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



Above 1 GHz



#### **TEST PROCEDURE**

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

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr	
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 36 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



#### **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

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT			
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 37 of 48	
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW		



#### **TEST RESULTS**

#### Below 1 GHz

# Operation Mode: EDR Mode (Channel : 2402)

Frequency	Reading	Ant. Factor	Cable Loss	ANT POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
113.42	16.04	10.8	1.3	Н	28.14	43.5	15.36
343.31	12.02	14.0	2.3	Н	28.32	46.0	17.68
427.70	11.80	16.0	2.7	Н	30.50	46.0	15.50
947.62	11.60	24.0	4.0	V	39.60	46.0	6.40

- 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 Normal Mode and EDR Mode test. Worst case of EUT is EDR Mode.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT			
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 38 of 48	
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW		



#### Above 1 GHz

#### Operation Mode: CH Low(GFSK)

Frequency	Reading	*A.F+CL-AMP GAIN	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Deleci
4804	40.29	9.71	Н	50.00	74	24.00	PK
4804	30.27	9.71	Н	39.98	54	14.02	AV
7206	31.11	18.71	Н	49.82	74	24.18	PK
7206	16.95	18.71	Н	35.66	54	18.34	AV
4804	40.68	9.71	V	50.39	74	23.61	PK
4804	30.63	9.71	V	40.34	54	13.66	AV
7206	31.73	18.71	V	50.44	74	23.56	PK
7206	17.20	18.71	V	35.91	54	18.09	AV

X A·F: ANTENNA FACTOR

C·L: CABLE LOSS AMP GAIN: AMPLIFIER GAIN

- 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.
- 3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Spectrum setting:
  - a. Peak Setting 1 GHz 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
- 5. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT			
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 39 of 48	
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW		



## Operation Mode: CH Mid(GFSK)

Frequency	Reading	*A.F+CL-AMP GAIN.	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4882	38.13	11.03	Н	49.16	74	24.84	PK
4882	29.24	11.03	Н	40.27	54	13.73	AV
7323	31.72	18.05	Н	49.77	74	24.23	PK
7323	17.64	18.05	Н	35.69	54	18.31	AV
4882	39.30	11.03	V	50.33	74	23.67	PK
4882	30.64	11.03	V	41.67	54	12.33	AV
7323	31.95	18.05	V	50.00	74	24.00	PK
7323	17.68	18.05	V	35.73	54	18.27	AV

\* A·F: ANTENNA FACTOR

C·L: CABLE LOSS

AMP GAIN: AMPLIFIER GAIN

- 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.
- 3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Spectrum setting:
  - a. Peak Setting 1 GHz 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
- 5. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 40 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



## Operation Mode: CH High(GFSK)

Frequency	Reading	*A.F+CL-AMP GAIN	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Deleci
4960	36.99	10.92	Н	47.91	74	26.09	PK
4960	27.61	10.92	Н	38.53	54	15.47	AV
7440	31.27	19.35	Н	50.62	74	23.38	PK
7440	17.58	19.35	Н	36.93	54	17.07	AV
4960	40.09	10.92	V	51.01	74	22.99	PK
4960	31.11	10.92	V	42.03	54	11.97	AV
7440	31.93	19.35	V	51.28	74	22.72	PK
7440	17.59	19.35	V	36.94	54	17.06	AV

\* A·F: ANTENNA FACTOR

C·L: CABLE LOSS

AMP GAIN: AMPLIFIER GAIN

- 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 > 20dB 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. Spectrum setting:
  - a. Peak Setting 1 GHz 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
- 5. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 41 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



#### 8.6.3 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

#### 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 Operating Frequency Channel No GFSK(Normal) 2402 MHz, 2480 MHz CH 0, CH 78

Frequency	Reading	₩A.F.+CL-AMP G	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Deleci
2313.52	17.34	37.96	Н	55.30	74	18.70	PK
2313.52	2.83	37.96	Н	40.79	54	13.21	AV
2364.72	16.28	37.96	V	54.24	74	19.76	PK
2364.72	2.89	37.96	V	40.85	54	13.15	AV
2483.50	15.52	39.92	Н	55.44	74	18.56	PK
2483.50	2.32	39.92	Н	42.24	54	11.76	AV
2483.50	15.48	39.92	V	55.40	74	18.60	PK
2483.50	3.88	39.92	V	43.80	54	10.20	AV

\* A·F: ANTENNA FACTOR

C·L: CABLE LOSS

AMP GAIN: AMPLIFIER GAIN

- 1. Spectrum setting:
  - a. Peak Setting 1 GHz 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz 26 GHz, RBW=1 MHz, VBW= 10 Hz.
- 2. We have done Normal Mode and EDR Mode test. Worst case of EUT is Normal Mode.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 42 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



# 8.7 POWERLINE CONDUCTED EMISSIONS

## LIMIT

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 microvolt (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.

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 43 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



# Test Plots Conducted Emissions (Line 1)

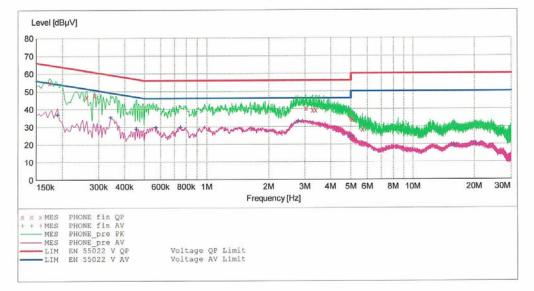
HCT

EMC

EUT:	TXT8035
Manufacturer:	PANTECH
Operating Condition:	BT MODE
Test Site:	SHIELD ROOM
Operator:	JS LEE
Test Specification:	CISPR22 CLASS B
Comment:	N

#### SCAN TABLE: "CISPR22 CLASS B"

Short Desc			CISPR 22 CL	ASS B		
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None



#### MEASUREMENT RESULT: "PHONE\_fin QP"

				1977 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (		
3:421	PM					
CV	Level	Transd	Limit	Margin	Line	PE
Hz	dBµV	dB	dBµV	dB		
00	54.90	10.1	65	9.9		
00	46.70	10.1	61	14.6		
00	47.70	10.1	61	13.0		
00	40.30	10.3	56	15.7		
00	39.30	10.3	56	16.7		
00	39.30	10.4	56	16.7		
00	34.80	10.5	56	21.2		
00	34.10	10.5	60	25.9		
00	28.60	10.5	60	31.4		
	Cy Hz 00 00 00 00 00 00 00 00 00 00	Hz dBμV 00 54.90 00 46.70 00 47.70 00 40.30 00 39.30 00 34.80 00 34.10	cy         Level         Transd           Hz         dBµV         dB           00         54.90         10.1           00         46.70         10.1           00         47.70         10.1           00         39.30         10.3           00         39.30         10.4           00         34.80         10.5	cy Hz         Level dBµV         Transd dB dBµV         Limit dBµV           00         54.90         10.1         65           00         46.70         10.1         61           00         47.70         10.1         61           00         40.30         10.3         56           00         39.30         10.4         56           00         34.80         10.5         56           00         34.10         10.5         60	3:42PM cy Level Transd Limit Margin Hz dBµV dB dBµV dB 00 54.90 10.1 65 9.9 00 46.70 10.1 61 14.6 00 47.70 10.1 61 13.0 00 40.30 10.3 56 15.7 00 39.30 10.3 56 16.7 00 39.30 10.4 56 16.7 00 34.80 10.5 56 21.2 00 34.10 10.5 60 25.9	3:42PM       Transd       Limit       Margin       Line         Hz       dBµV       dB       dBµV       dB         00       54.90       10.1       65       9.9          00       46.70       10.1       61       14.6          00       47.70       10.1       61       13.0          00       40.30       10.3       56       15.7          00       39.30       10.3       56       16.7          00       39.30       10.4       56       16.7          00       34.80       10.5       56       21.2          00       34.10       10.5       60       25.9

Page 1/2 11/1/2010 3:42PM HCT EMC LAB

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 44 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



#### MEASUREMENT RESULT: "PHONE\_fin AV"

11/1/2010	3:421	M					
Frequen M	cy Hz	dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.1900	00	36.80	10.1	54	17.2		
0.3420	00	35.10	10.1	49	14.1		
0.4580	00	28.70	10.1	47	18.1		
0.5720	00	29.50	10.1	46	16.5		
0.7520	00	29.60	10.1	46	16.4		
2.7880	00	33.10	10.3	46	12.9		
5.0000	00	24.50	10.5	46	21.5		
15.8760	00	19.40	11.0	50	30.6		
20.3120	00	19.80	11.6	50	30.2		

Page 2/2 11/1/2010 3:42PM HCT EMC LAB

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT				
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 45 of 48		
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW			



## **Conducted Emissions (Line 2)**

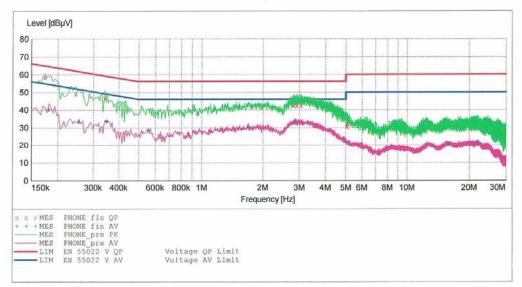
HCT

#### EMC

EUT:	TXT8035
Manufacturer:	PANTECH
Operating Condition:	BT MODE
Test Site:	SHIELD ROOM
Operator:	JS LEE
Test Specification:	CISPR22 CLASS B
Comment:	Н

#### SCAN TABLE: "CISPR22 CLASS B"

Short Desc	ription:		CISPR 22 CL	ASS B		
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



#### MEASUREMENT RESULT: "PHONE\_fin QP"

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.174000	58.50	10.1	65	6.3		
0.246000	49.20	10.1	62	12.7		
0.342000	46.70	10.1	59	12.4		
2.832000	42.70	10.3	56	13.3		
2.924000	42.50	10.3	56	13.5		
3.060000	42.70	10.3	56	13.3		
5.040000	32.10	10.5	60	27.9		
5.080000	32.00	10.5	60	28.0		
5.104000	30.80	10.5	60	29.2		

Page 1/2 11/1/2010 3:39PM HCT EMC LAB

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 46 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



#### MEASUREMENT RESULT: "PHONE\_fin AV"

11/1/2010	3:39	PM					
Frequen M	cy Hz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.1820	00	40.00	10.1	54	14.4		
0.2540	00	33.20	10.1	52	18.5		
0.3500	00	33.50	10.1	49	15.5		
0.5560	00	28.50	10.1	46	17.5		
1.6960	00	30.00	10.2	46	16.0		
2.8560	00	33.00	10.3	46	13.0		
5.0000	00	21.70	10.5	46	24.3		
15.8720	00	20.70	11.0	50	29.3		
22.0880	00	20.80	11.6	50	29.2		

Page 2/2 11/1/2010 3:39PM HCT EMC LAB

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 47 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	



# 9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.	
Rohde & Schwarz	ESH2-Z5/ LISN	Annual	03/24/2011	861741/013	
Rohde & Schwarz	ESH3-Z6/ LISN	Annual	03/05/2011	100329	
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/18/2010	9160-3150	
HD	MA240/ Antenna Position Tower	N/A	N/A	556	
EMCO	1050/ Turn Table	N/A	N/A	114	
HD GmbH	HD 100/ Controller	N/A	N/A	13	
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12	
Rohde & Schwarz	ESH3-Z2/ PULSE LIMITER	Annual	10/25/2011	375.8810.352	
MITEQ	AMF-6D-001180-35-20P/AMP	Annual	05/20/2011	990893	
MITEQ	AFS44-00101800-35-20P-44-PS/AMP	Annual	04/05/2011	1119544	
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	09/23/2011	296	
Rohde & Schwarz	FSP30 / Spectrum Analyzer	Annual	03/25/2011	839117/011	
Agilent	E4440A / Spectrum Analyzer	Annual	06/09/2011	US45303008	
Agilent	E4416A /Power Meter	Annual	01/14/2011	GB41291412	
Agilent	E9327A /POWER SENSOR	Annual	07/23/2011	MY4442009	
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	06/25/2011	1	
Wainwright Instrument	WRCJ2400/2483.5-2370/2520- 60/14SS / Band Reject Filter	Annual	07/23/2011	1	
Hewlett Packard	11636B/Power Divider	Annual	12/24/2010	11377	
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	01/08/2011	3110117	
ITECH	IT6720 / DC POWER SUPPLY	Annual	12/01/2010	010002156287001199	
TESCOM	TC-3000A / BLUETOOTH TESTER	Annual	01/11/2011	3000A490112	
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	06/24/2011	100422	
EMCO	6502.LOOP ANTENNA	Biennial	01/13/2012	9009-2536	

FCC PT.15.247 TEST REPORT		www.hct.co.kr		
Test Report No.	Date of Issue:	EUT Type:	FCC ID :	Page 48 of 48
HCTR1011FR02	November 01, 2010	Cellular PCS/ CDMA with Bluetooth Phone	JYCTOW	