

HCT CO., LTD.**CERTIFICATE OF COMPLIANCE**
FCC Certification**Applicant Name:**
Pantech Co., Ltd.**Address:**
Pantech Bldg, I-2, DMC, Sangam-dong, Mapo-gu,
Seoul, 121-792, Korea**Date of Issue:**
August 14, 2012**Test Site/Location:**
HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon,
Icheon-si, Kyunggi-Do, Korea**Report No.:** HCTR1208FR13
HCT FRN: 0005866421**FCC ID:** **JYCCDMAPTL21****APPLICANT:** **Pantech Co., Ltd.****FCC Model(s):** CDMA PTL21**EUT Type:** GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC**FCC Classification:** Licensed Portable Transmitter Held to Ear (PCE)**FCC Rule Part(s):** §22, §24, §2**Tx Frequency:**
824.20 - 848.80 MHz (GSM850)
826.40 - 846.60 MHz (WCDMA850)
1 850.20 - 1 909.80 MHz (GSM1900)
1 852.4 - 1 907.6 MHz (WCDMA1900)**Rx Frequency:**
869.20 - 893.80 MHz (GSM850)
871.40 - 891.60 (WCDMA850)
1 930.20 - 1 989.80 MHz (GSM1900)
1 932.4 - 1 987.6 MHz (WCDMA1900)**Max. RF Output Power:**
0.631 W ERP GSM850 (28.00 dBm) / 0.721 W EIRP GSM1900 (28.58 dBm)
0.218 W ERP WCDMA850 (23.38 dBm) / 0.298 W EIRP WCDMA1900 (24.74 dBm)**Emission Designator(s):** 243 KGXW (GSM850) 242 KGXW (GSM1900)
4M18F9W (WCDMA850) 4M17F9W (WCDMA1900)

The measurements shown in this report were made in accordance with the procedures specified in §2.947. 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**
: Jae Chul Shin
Test engineer of RF Team**Approved by**
: Chang Seok Choi
Manager of RF Team

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FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21



Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1208FR13	August 14, 2012	First Approval Report

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21

Table of Contents

1. GENERAL INFORMATION	4
2. INTRODUCTION	5
2.1. EUT DESCRIPTION.....	5
2.2. MEASURING INSTRUMENT CALIBRATION.....	5
2.3. TEST FACILITY	5
3. DESCRIPTION OF TESTS	6
3.1 EFFECTIVE RADIATED POWER/EQUIVALENT ISOTROPIC RADIATED POWER.....	6
3.2 PEAK- TO- AVERAGE RATIO.....	7
3.3 OCCUPIED BANDWIDTH.....	8
3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.....	9
3.5 RADIATED SPURIOUS AND HARMONIC EMISSIONS	10
3.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE	11
4. LIST OF TEST EQUIPMENT	12
5. SUMMARY OF TEST RESULTS	13
6. SAMPLE CALCULATION.....	14
7. TEST DATA	15
7.1 CONDUCTED OUTPUT POWER	15
7.2 PEAK-TO-AVERAGE RATIO	16
7.3 OCCUPIED BANDWIDTH	17
7.4 CONDUCTED SPURIOUS EMISSIONS	18
7.4.1 BAND EDGE.....	18
7.5 EFFECTIVE RADIATED POWER OUTPUT (GSM / WCDMA)	19
7.6 EQUIVALENT ISOTROPIC RADIATED POWER (GSM / WCDMA)	20
7.7 RADIATED SPURIOUS EMISSIONS	21
7.7.1 RADIATED SPURIOUS EMISSIONS (GSM850).....	21
7.7.2 RADIATED SPURIOUS EMISSIONS (GSM1900).....	22
7.7.3 RADIATED SPURIOUS EMISSIONS (WCDMA850).....	23
7.7.4 RADIATED SPURIOUS EMISSIONS (WCDMA1900).....	24
7.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE	25
7.8.1 FREQUENCY STABILITY (GSM850)	25
7.8.2 FREQUENCY STABILITY (GSM1900)	26
7.8.3 FREQUENCY STABILITY (WCDMA850)	27
7.8.4 FREQUENCY STABILITY (WCDMA1900)	28
8. TEST PLOTS.....	오류! 책갈피가 정의되어 있지 않습니다.

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	Pantech Co., Ltd.
Address:	Pantech Bldg, I-2, DMC, Sangam-dong, Mapo-gu, Seoul, 121-792, Korea
FCC ID:	JYCCDMAPTL21
Application Type:	Certification
FCC Classification:	Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22, §24, §2
EUT Type:	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC
FCC Model(s):	CDMA PTL21
Tx Frequency:	824.20 - 848.80 MHz (GSM850) 826.40 - 846.60 MHz (WCDMA850) 1 850.20 - 1 909.80 MHz (GSM1900) 1 852.4 – 1 907.6 MHz (WCDMA1900)
Rx Frequency:	869.20 - 893.80 MHz (GSM850) 871.40 - 891.60 (WCDMA850) 1 930.20 - 1 989.80 MHz (GSM1900) 1 932.4 – 1 987.6 MHz (WCDMA1900)
Max. RF Output Power:	0.631 W ERP GSM850 (28.00 dBm) / 0.721 W EIRP GSM1900 (28.58 dBm) 0.218 W ERP WCDMA850 (23.38 dBm) / 0.298 W EIRP WCDMA1900 (24.74 dBm)
Emission Designator(s):	243 KGXW (GSM850) 242 KGXW (GSM1900) 4M18F9W (WCDMA850) 4M17F9W (WCDMA1900)
Date(s) of Tests:	July 13, 2012 ~ August 10, 2012
Antenna Specification	Manufacturer: ARRO CO.LTD Antenna type: INTERNAL Antenna Peak Gain: GSM850/WCDMA850 : -0.65 dBi GSM1900/WCDMA1900 : -0.31 dBi

FCC CERTIFICATION REPORT			
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21



2. INTRODUCTION

2.1. EUT DESCRIPTION

The Pantech Co., Ltd. CDMA PTL21 GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC consists of GSM850, GSM1900, WCDMA850, WCDMA1900, GPRS Class10 and HSDPA.

2.2. MEASURING 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 equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri , Majang-Myeon, Icheon-si, 467-811, KOREA.

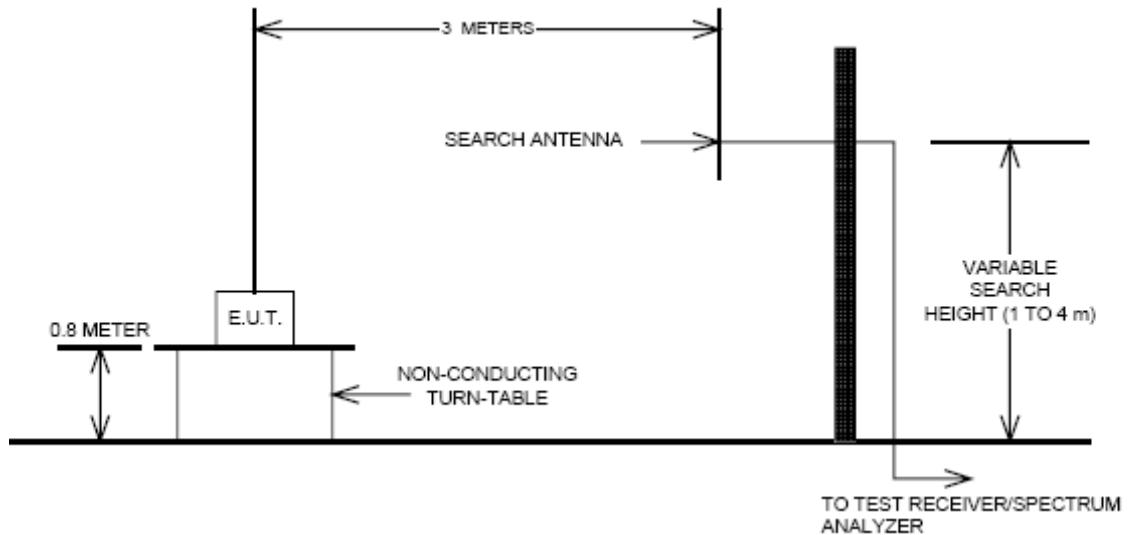
The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 02, 2011 (Registration Number: 90661)

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21

3. DESCRIPTION OF TESTS

3.1 EFFECTIVE RADIATED POWER/EQUIVALENT ISOTROPIC RADIATED POWER

Test Set-up



Radiated emission measurements were performed at an Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters from the receive antenna. A turntable was rotated 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the previously recorded signal was duplicated.

The maximum EIRP was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21



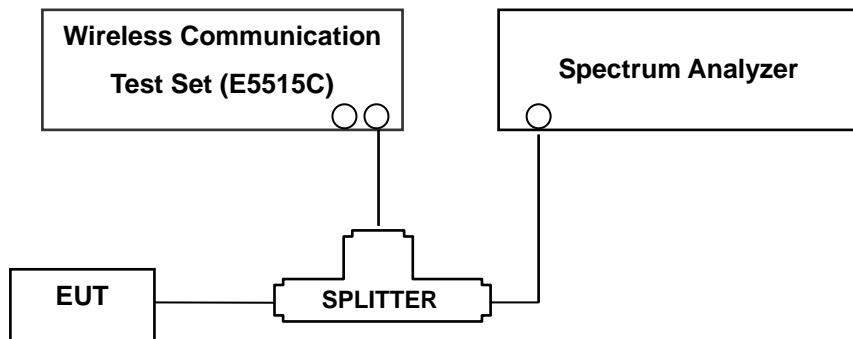
3.2 PEAK- TO- AVERAGE RATIO

A peak to average ratio measurement is performed at the conducted port of the EUT. For CDMA and WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. Plots of the EUT's Peak- to- Average Ratio are shown herein.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

3.3 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

Test Procedure

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels(low, middle and high operational range.)

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. The RBW settings used in the testing are greater than 1 % of the occupied bw. The 1 MHz RBW was used to scan from 10 MHz to 10 GHz. (GSM1900 Mode: 10 MHz to 20 GHz). A display line was placed at – 13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.

- Band Edge Requirement : According to FCC 22.917 , 24.238(a) specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

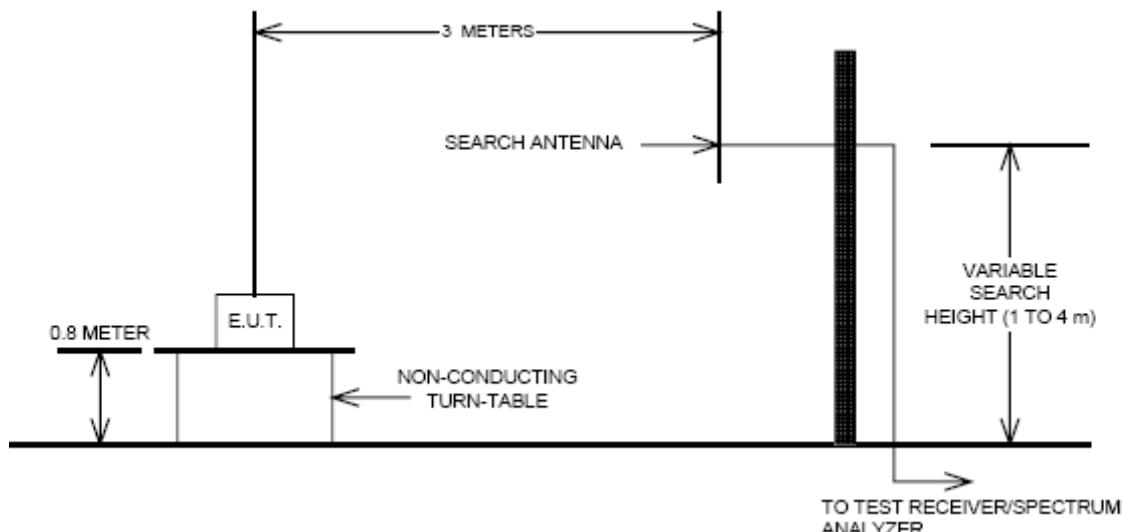
The center frequency of spectrum is the band edge frequency and span is 1MHz RB of the spectrum is 3KHz and VB of the spectrum is 3KHz (GSM)

The center frequency of spectrum is the band edge frequency and span is 5MHz RB of the spectrum is 100KHz and VB of the spectrum is 100KHz(WCDMA)

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

3.5 RADIATED SPURIOUS AND HARMONIC EMISSIONS

Test Set-up



The measurement facilities used for this test have been documented in previous filings with the commission pursuant to section § 2.948. The Fully-anechoic chamber meets requirements in ANSI C63.4 –2003. A mast capable of lifting the receiving antenna from a height of one to four meters is used together with a rotatable platform mounted at three from the antenna mast.

- 1) The unit mounted on a turntable 1.5 m × 1.0 m × 0.80 m is 0.8 meter above test site ground level.
- 2) During the emission test, the turntable is rotated and the EUT is manipulated to find the configuration resulting in maximum emission under normal condition of installation and operation.
- 3) The antenna height and polarization are also varied from 1 to 4 meters until the maximum signal is found.
- 4) The spectrum shall be scanned up to the 10th harmonic of the fundamental frequency.

Test Procedure

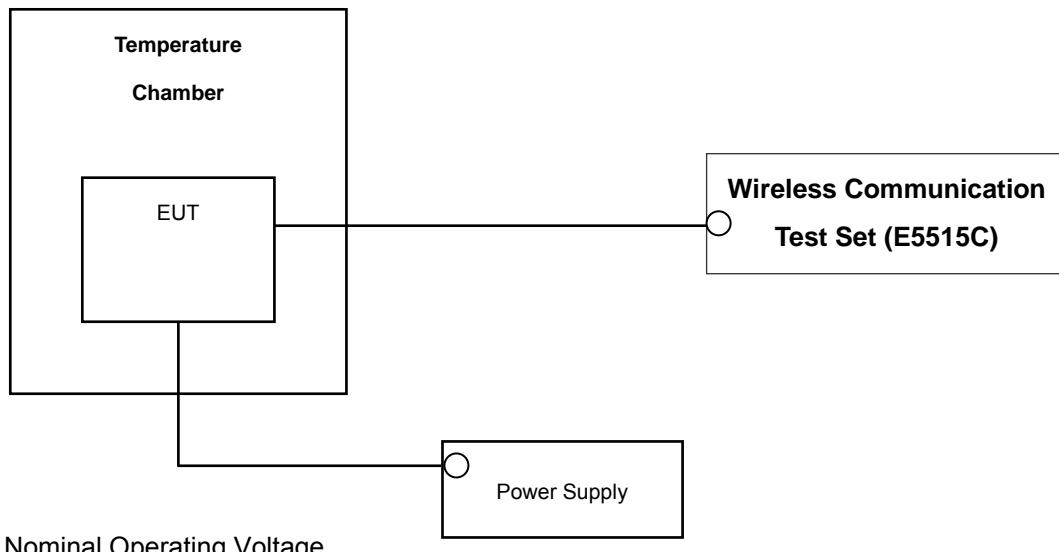
The equipment under test is placed on a non-conductive table 3-meters from the receive antenna. A turntable was rotated 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the previously recorded signal was duplicated.

The maximum EIRP was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

3.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



Test Procedure

The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from battery end point to 115 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.000\ 25\% (\pm 2.5\ ppm)$ of the center frequency.

Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).

1. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
2. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

NOTE: The EUT is tested down to the battery endpoint.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
Agilent	N9020A	MY51110020	Annual	09/23/2012
Agilent	E9327A/ Power Sensor	MY4442009	Annual	05/02/2013
R&S	CMW500/ Base Station	1201.0002K50_116858	Annual	01/17/2013
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	Annual	09/24/2012
Wainwright	WHK1.2/15G-10EF/H.P.F	2	Annual	05/02/2013
Wainwright	WHK3.3/18G-10EF/H.P.F	1	Annual	05/02/2013
Hewlett Packard	11667B / Power Splitter	10126	Annual	11/04/2012
Digital	EP-3010/ Power Supply	3110117	Annual	11/07/2012
Schwarzbeck	UHAP/ Dipole Antenna	557	Biennial	03/11/2013
Schwarzbeck	UHAP/ Dipole Antenna	558	Biennial	03/11/2013
Korea Engineering	KR-1005L / Chamber	KRAB05063-3CH	Annual	11/07/2012
Schwarzbeck	BBHA 9120D/ Horn Antenna	296	Biennial	02/20/2014
Agilent	E4440A/Spectrum Analyzer	US45303008	Annual	05/02/2013
WEINSCHEL	ATTENUATOR	BR0592	Annual	11/07/2012
REOHDE&SCHWARZ	FSP30/Spectrum Analyzer	839117/011	Annual	02/09/2013
Agilent	8960 (E5515C)/ Base Station	GB44400269	Annual	02/10/2013

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049, 22.917(a), 24.238(a)	Occupied Bandwidth	N/A		PASS
2.1051, 22.917(a), 24.238(a)	Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions		PASS
2.1046	Conducted Output Power	-	CONDUCTED	PASS
24.232(d)	Peak- to- Average Ratio	< 13 dB		PASS
2.1055, 22.355, 24.235	Frequency stability / variation of ambient temperature	< 2.5 ppm		PASS
22.913(a)(2) 24.232(c)	Effective Radiated Power	< 7 Watts max. ERP	RADIATED	PASS
	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS
2.1053, 22.917(a), 24.238(a)	Radiated Spurious and Harmonic Emissions	< 43 + 10log10 (P[Watts]) for all out-of band emissions		PASS

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

6. SAMPLE CALCULATION

A. ERP Sample Calculation

Mode	Ch./ Freq.		Measured Level(dBm)	Substitute LEVEL(dBm)	Ant. Gain	C.L	Pol.	ERP	
	channel	Freq.(MHz)						W	dBm
GSM850	128	824.20	-11.56	34.28	-8.32	1.17	H	0.30	24.79

ERP = SubstituteLEVEL(dBm) + Ant. Gain – CL(Cable Loss)

- 1) The EUT mounted on a non-conductive turntable is 0.8 meter above test site ground level.
- 2) During the test , the turn table is rotated and the antenna height is also varied from 1 to 4 meters until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power (**ERP**).

B. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

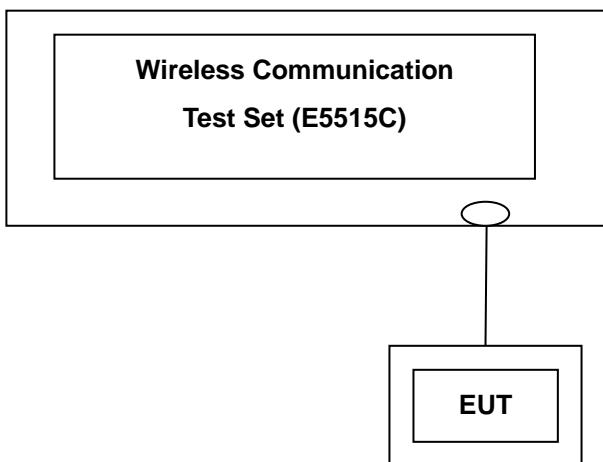
W = Combination (Audio/Data)

FCC CERTIFICATION REPORT						www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:			FCC ID:	
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC			JYCCDMAPTL21	

7. TEST DATA

7.1 CONDUCTED OUTPUT POWER

A base station simulator was used to establish communication with the EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Test Result

Band	Channel	Voice	GPRS Data	
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)
GSM 850	128	32.44	32.44	31.88
	190	32.74	32.68	32.10
	251	32.75	32.68	32.08
GSM 1900	512	29.38	29.38	29.36
	661	29.26	29.26	29.23
	810	29.36	29.36	29.31

(GSM Conducted Maximum Output Powers)

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:		
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

3GPP Release Version	Mode	3GPP 34.121	Cellular Band [dBm]			MPR
		Subtest	UL 4132 (826.4)	UL 4183 (836.6)	UL 4233 (846.6)	
			DL 4357	DL 4408	DL 4458	
99	WCDMA	12.2 kbps RMC	23.00	23.04	23.11	-
99	WCDMA	12.2 kbps AMR	23.03	23.02	23.12	-
5	HSDPA	Subtest 1	22.97	23.05	23.18	0

3GPP Release Version	Mode	3GPP 34.121	PCS Band [dBm]			MPR
		Subtest	UL 9262 (1852.4)	UL 9400 (1880.0)	UL 9538 (1907.6)	
			DL 9662	DL 9800	DL 9938	
99	WCDMA	12.2 kbps RMC	23.34	23.43	23.45	-
99	WCDMA	12.2 kbps AMR	23.35	23.43	23.39	-
5	HSDPA	Subtest 1	23.45	23.42	23.40	0

(WCDMA Conducted Output Powers)

Note : Detecting mode is average.

7.2 PEAK-TO-AVERAGE RATIO

- Plots of the EUT's Peak- to- Average Ratio are shown Page 33, 36.

FCC CERTIFICATION REPORT					www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:			FCC ID:
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC			JYCCDMAPTL21

7.3 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (GSM: kHz / WCDMA : MHz)
GSM850	128	824.20	242.7863
	190	836.60	241.1871
	251	848.80	242.7799
GSM1900	512	1850.20	240.8017
	661	1880.00	242.1870
	810	1909.80	241.6620
WCDMA850	4132	826.40	4.1825
	4183	836.60	4.1579
	4233	846.60	4.1331
WCDMA1900	9262	1852.40	4.1574
	9400	1880.00	4.1678
	9538	1907.60	4.1574

- Plots of the EUT's Occupied Bandwidth are shown Page 30 ~ 32, 33 ~ 36.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

7.4 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Maximum Data (dBm)
GSM850	128	6.8250	-29.45
	190	7.1000	-30.43
	251	7.1500	-30.20
GSM1900	512	14.4530	-34.51
	661	14.2400	-34.26
	810	13.6270	-34.89
WCDMA850	4132	1.6520	-40.03
	4183	7.1125	-40.10
	4233	7.7125	-40.65
WCDMA1900	9262	3.7090	-36.57
	9400	13.9200	-37.51
	9538	3.8150	-37.16

- Plots of the EUT's Conducted Spurious Emissions are shown Page 45 ~ 56.

7.4.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 37 ~ 44.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

7.5 EFFECTIVE RADIATED POWER OUTPUT (GSM / WCDMA)

(GSM850 Mode)

Ch./ Freq.		Measured Level(dBm)	Substitute LEVEL (dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
channel	Freq.(MHz)						W	dBm
128	824.20	-8.87	40.06	-10.54	1.61	V	0.618	27.91
190	836.60	-8.75	40.17	-10.50	1.67	V	0.631	28.00
251	848.80	-9.17	39.89	-10.47	1.64	V	0.600	27.78

(WCDMA850 Mode)

Ch./ Freq.		Measured Level(dBm)	Substitute LEVEL (dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
channel	Freq.(MHz)						W	dBm
4132	826.40	-14.05	34.88	-10.54	1.61	V	0.187	22.73
4183	836.60	-14.32	34.60	-10.50	1.67	V	0.175	22.43
4233	846.60	-13.38	35.50	-10.47	1.65	V	0.218	23.38

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 5MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1" and in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is y plane in GSM850 and WCDMA850 mode. Also worst case of detecting Antenna is vertical polarization in GSM850 and WCDMA850 mode.

FCC CERTIFICATION REPORT						www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:				FCC ID:
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC				JYCCDMAPTL21



7.6 EQUIVALENT ISOTROPIC RADIATED POWER (GSM / WCDMA)

(GSM1900 Mode)

Ch./ Freq.		Measured Level(dBm)	Substitute LEVEL (dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
512	1,850.20	-13.25	18.69	10.23	1.78	H	0.518	27.14
661	1,880.00	-12.69	19.44	10.25	1.77	H	0.619	27.92
810	1,909.80	-12.16	20.04	10.29	1.75	H	0.721	28.58

(WCDMA1900 Mode)

Ch./ Freq.		Measured Level(dBm)	Substitute LEVEL (dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
9262	1,852.40	-15.88	16.06	10.23	1.78	H	0.282	24.51
9400	1,880.00	-15.87	16.26	10.25	1.77	H	0.298	24.74
9538	1,907.60	-17.41	14.79	10.29	1.75	H	0.215	23.33

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method
according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 5MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1" and in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is x plane in GSM1900 and WCDMA1900 mode. Also worst case of detecting Antenna is in horizontal polarization in GSM1900 and WCDMA1900 mode.

FCC CERTIFICATION REPORT						www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:				FCC ID:
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC				JYCCDMAPTL21

7.7 RADIATED SPURIOUS EMISSIONS

7.7.1 RADIATED SPURIOUS EMISSIONS (GSM850)

MEASURED OUTPUT POWER: 28.00 dBm = 0.631 W
 MODULATION SIGNAL: GSM850
 DISTANCE: 3 meters
 LIMIT: - (43 + 10 \log_{10} (W)) = - 41.00 dBc

Ch.	Freq.(MHz)	<u>Measured Level</u> [dBm]	Ant. Gain (dBi)	<u>Substitute</u> <u>Level</u> [dBm]	C.L	Pol.	ERP (dBm)	dBc
128 (824.2)	1,648.40	-35.82	9.69	-45.11	1.71	H	-37.13	-65.13
	2,472.60	-36.85	10.56	-42.69	2.08	H	-34.21	-62.21
	3,296.80	-46.92	11.84	-53.06	2.45	V	-43.67	-71.67
190 (836.6)	1,673.20	-34.45	9.82	-44.06	1.74	H	-35.98	-63.98
	2,509.80	-35.04	10.57	-41.01	2.11	H	-32.55	-60.55
	3,346.40	-45.19	11.96	-51.85	2.48	V	-42.37	-70.37
251 (848.8)	1,697.60	-33.60	10.01	-43.02	1.70	H	-34.71	-62.71
	2,546.40	-35.87	10.60	-41.65	2.13	H	-33.18	-61.18
	3,395.20	-46.20	12.09	-52.82	2.53	V	-43.26	-71.26

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004;
2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC CERTIFICATION REPORT					www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:			FCC ID:
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC			JYCCDMAPTL21

7.7.2 RADIATED SPURIOUS EMISSIONS (GSM1900)

MEASURED OUTPUT POWER: 28.58 dBm = 0.721 W
 MODULATION SIGNAL: GSM1900
 DISTANCE: 3 meters
 LIMIT: - (43 + 10 log₁₀ (W)) = - 41.58 dBc

Ch.	Freq.(MHz)	<u>Measured Level</u> [dBm]	Ant. Gain (dBi)	<u>Substitute</u> <u>Level</u> [dBm]	C.L	Pol.	EIRP (dBm)	dBc
512 (1850.2)	3,700.40	-32.66	12.50	-37.63	2.55	H	-27.68	-56.26
	5,550.60	-42.87	13.04	-41.94	3.17	H	-32.07	-60.65
	7,400.80	-52.03	11.10	-40.93	3.54	H	-33.37	-61.95
661 (1880.0)	3,760.00	-29.20	12.54	-33.88	2.60	H	-23.94	-52.52
	5,640.00	-43.38	13.05	-41.84	3.21	H	-32.00	-60.58
	7,520.00	-51.40	10.99	-40.89	3.72	V	-33.62	-62.20
810 (1909.8)	3,819.60	-29.31	12.59	-33.75	2.59	H	-23.75	-52.33
	5,729.40	-44.49	13.07	-42.46	3.35	H	-32.74	-61.32
	7,639.20	-48.94	11.06	-38.96	3.23	V	-31.13	-59.71

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004;
2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

7.7.3 RADIATED SPURIOUS EMISSIONS (WCDMA850)

MEASURED OUTPUT POWER: 23.38 dBm = 0.218 W
 MODULATION SIGNAL: WCDMA850
 DISTANCE: 3 meters
 LIMIT: - (43 + 10 log₁₀ (W)) = - 36.38 dBc

Ch.	Freq.(MHz)	<u>Measured Level</u> [dBm]	Ant. Gain (dBi)	<u>Substitute</u> <u>Level</u> [dBm]	C.L	Pol.	ERP (dBm)	dBc
4,132 (826.4)	1,652.80	-54.43	9.69	-63.72	1.71	V	-55.74	-79.12
	2,479.20	-	-	-	-	-	-	-
	3,305.60	-	-	-	-	-	-	-
4,183 (836.6)	1,673.20	-49.95	9.82	-59.56	1.74	V	-51.48	-74.86
	2,509.80	-	-	-	-	-	-	-
	3,346.40	-	-	-	-	-	-	-
4,233 (846.6)	1,693.20	-49.55	10.01	-58.97	1.70	H	-50.66	-74.04
	2,539.80	-54.67	10.60	-60.45	2.13	V	-51.98	-75.36
	3,386.40	-	-	-	-	-	-	-

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004;
2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC CERTIFICATION REPORT					www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:			FCC ID:
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC			JYCCDMAPTL21

7.7.4 RADIATED SPURIOUS EMISSIONS (WCDMA1900)

MEASURED OUTPUT POWER: 24.74 dBm = 0.298 W
 MODULATION SIGNAL: WCDMA1900
 DISTANCE: 3 meters
 LIMIT: - (43 + 10 \log_{10} (W)) = - 37.74 dBc

Ch.	Freq.(MHz)	<u>Measured Level</u> <u>[dBm]</u>	Ant. Gain (dBi)	<u>Substitute</u> <u>Level</u> <u>[dBm]</u>	C.L	Pol.	EIRP (dBm)	dBc
9262	3,704.80	-38.17	12.50	-43.14	2.55	H	-33.19	-57.93
	5,557.20	-49.46	13.00	-48.51	3.19	H	-38.70	-63.44
	7,409.60	-55.54	11.09	-44.53	3.60	V	-37.04	-61.78
9400	3,760.00	-37.86	12.54	-42.54	2.60	H	-32.60	-57.34
	5,640.00	-55.07	13.05	-53.53	3.21	H	-43.69	-68.43
	7,520.00	-54.68	10.99	-44.17	3.72	V	-36.90	-61.64
9538	3,815.20	-37.44	12.59	-41.88	2.59	H	-31.88	-56.62
	5,722.80	-53.52	13.07	-51.30	3.35	H	-41.58	-66.32
	7,630.40	-54.21	11.05	-44.23	3.22	V	-36.40	-61.14

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004;
2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

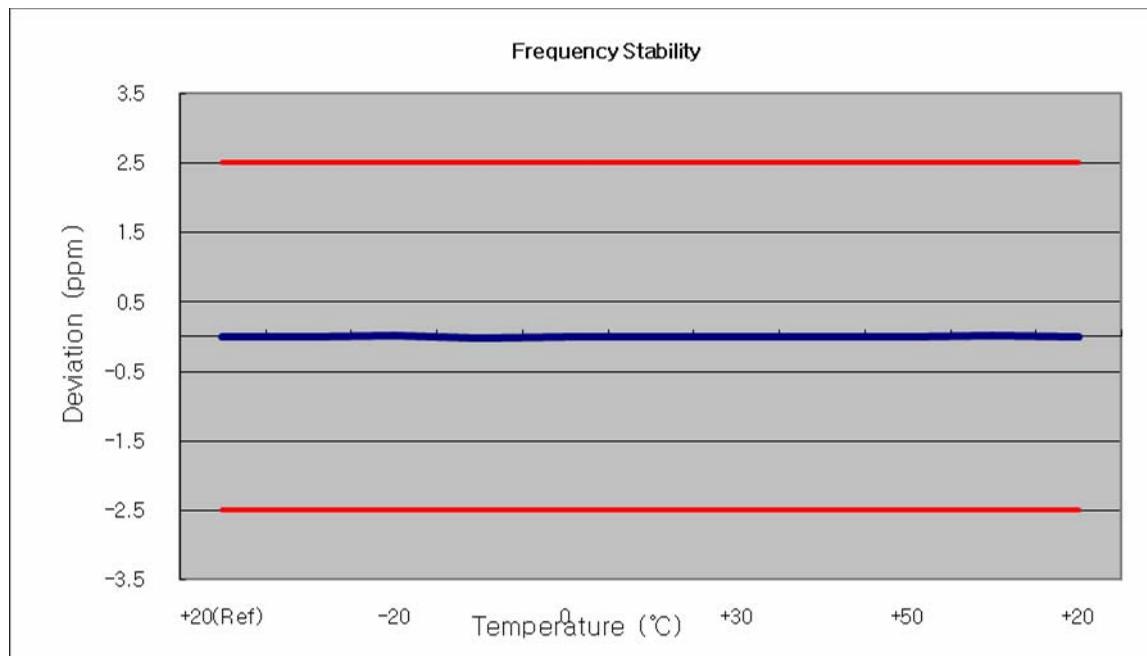
FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

7.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

7.8.1 FREQUENCY STABILITY (GSM850)

- OPERATING FREQUENCY: 836,600,000 Hz
- CHANNEL: 190
- REFERENCE VOLTAGE: 3.7 VDC
- DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	836 599 994	0	0.000 000	0.000
100%		-30	836 599 984	-10.24	-0.000 001	-0.012
100%		-20	836 600 000	6.11	0.000 001	0.007
100%		-10	836 599 983	-11.62	-0.000 001	-0.014
100%		0	836 599 984	-10.36	-0.000 001	-0.012
100%		+10	836 599 988	-5.85	-0.000 001	-0.007
100%		+30	836 599 989	-5.48	-0.000 001	-0.007
100%		+40	836 599 986	-8.51	-0.000 001	-0.010
100%		+50	836 599 987	-7.08	-0.000 001	-0.008
115%	4.255	+20	836 600 001	6.59	0.000 001	0.008
Batt. Endpoint	3.400	+20	836 599 988	-5.89	-0.000 001	-0.007

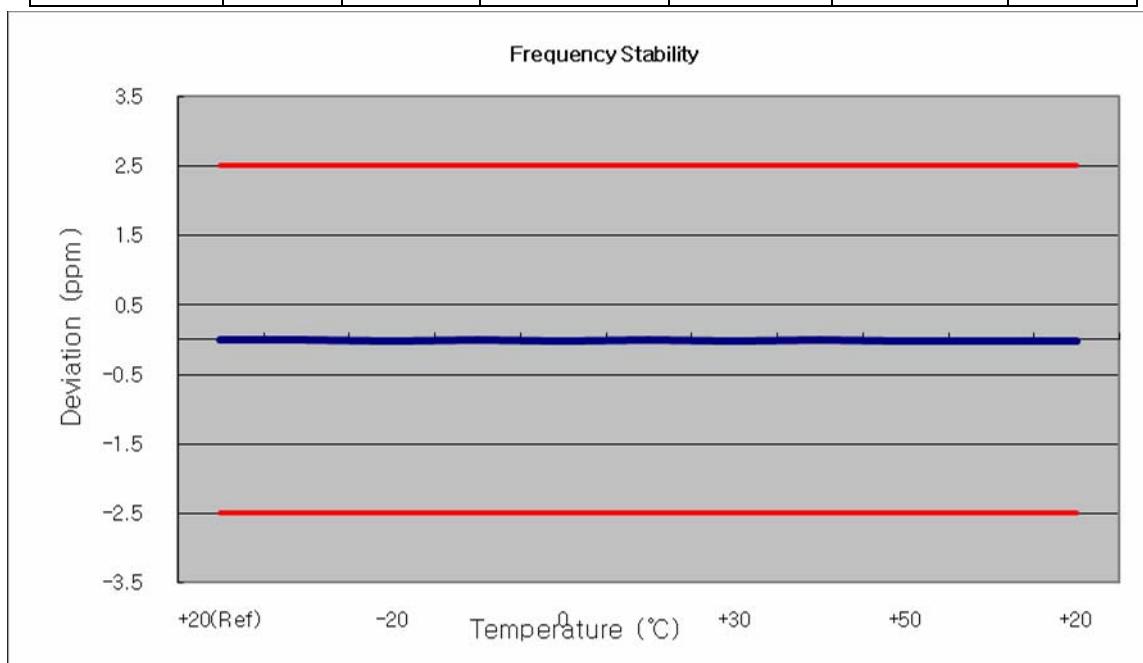


FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

7.8.2 FREQUENCY STABILITY (GSM1900)

OPERATING FREQUENCY: 1880,000,000 Hz
 CHANNEL: 661
 REFERENCE VOLTAGE: 3.7 VDC
 DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	1880 000 024	0	0.000 000	0.000
100%		-30	1880 000 005	-18.89	-0.000 001	-0.010
100%		-20	1879 999 999	-25.57	-0.000 001	-0.014
100%		-10	1880 000 003	-21.31	-0.000 001	-0.011
100%		0	1879 999 998	-25.91	-0.000 001	-0.014
100%		+10	1880 000 005	-19.75	-0.000 001	-0.011
100%		+30	1879 999 993	-31.20	-0.000 002	-0.017
100%		+40	1880 000 001	-23.20	-0.000 001	-0.012
100%		+50	1879 999 999	-25.24	-0.000 001	-0.013
115%	4.255	+20	1879 999 988	-36.60	-0.000 002	-0.019
Batt. Endpoint	3.400	+20	1879 999 997	-27.37	-0.000 001	-0.015

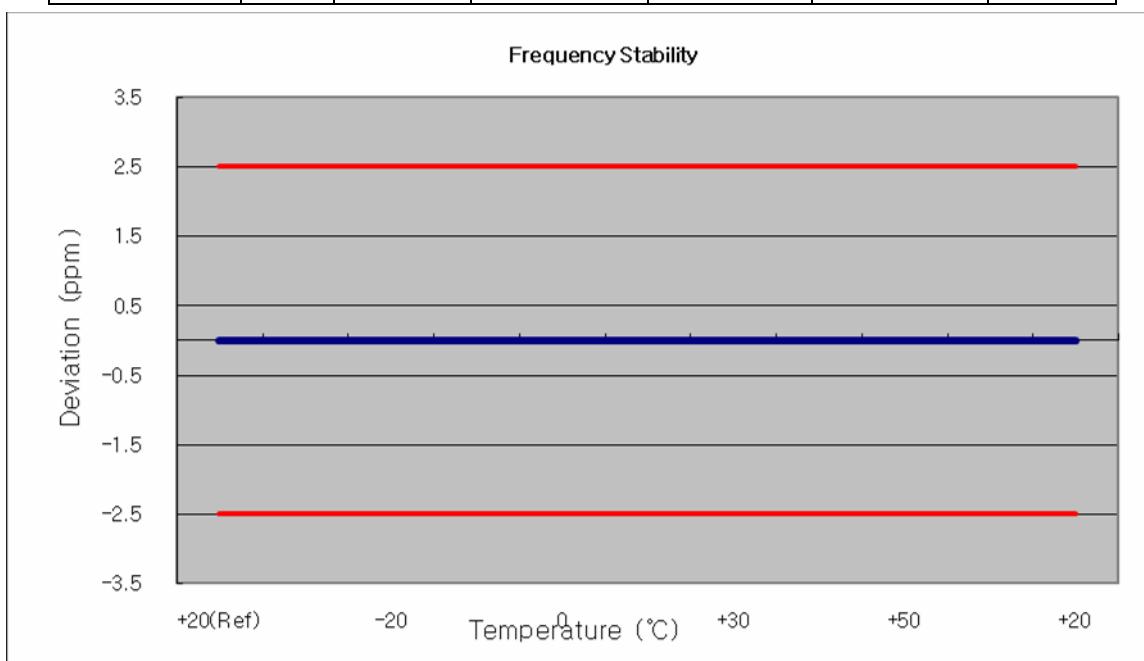


FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

7.8.3 FREQUENCY STABILITY (WCDMA850)

OPERATING FREQUENCY: 836,600,000 Hz
 CHANNEL: 4183
 REFERENCE VOLTAGE: 3.7 VDC
 DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	836 599 998	0	0.000 000	0.000
100%		-30	836 599 997	-2.57	0.000 000	-0.003
100%		-20	836 599 998	-2.30	0.000 000	-0.003
100%		-10	836 599 998	-2.26	0.000 000	-0.003
100%		0	836 599 998	-2.01	0.000 000	-0.002
100%		+10	836 599 998	-2.28	0.000 000	-0.003
100%		+30	836 599 998	-1.70	0.000 000	-0.002
100%		+40	836 599 998	-2.01	0.000 000	-0.002
100%		+50	836 600 002	2.30	0.000 000	0.003
115%	4.255	+20	836 599 998	-2.39	0.000 000	-0.003
Batt. Endpoint	3.400	+20	836 599 998	-1.58	0.000 000	-0.002

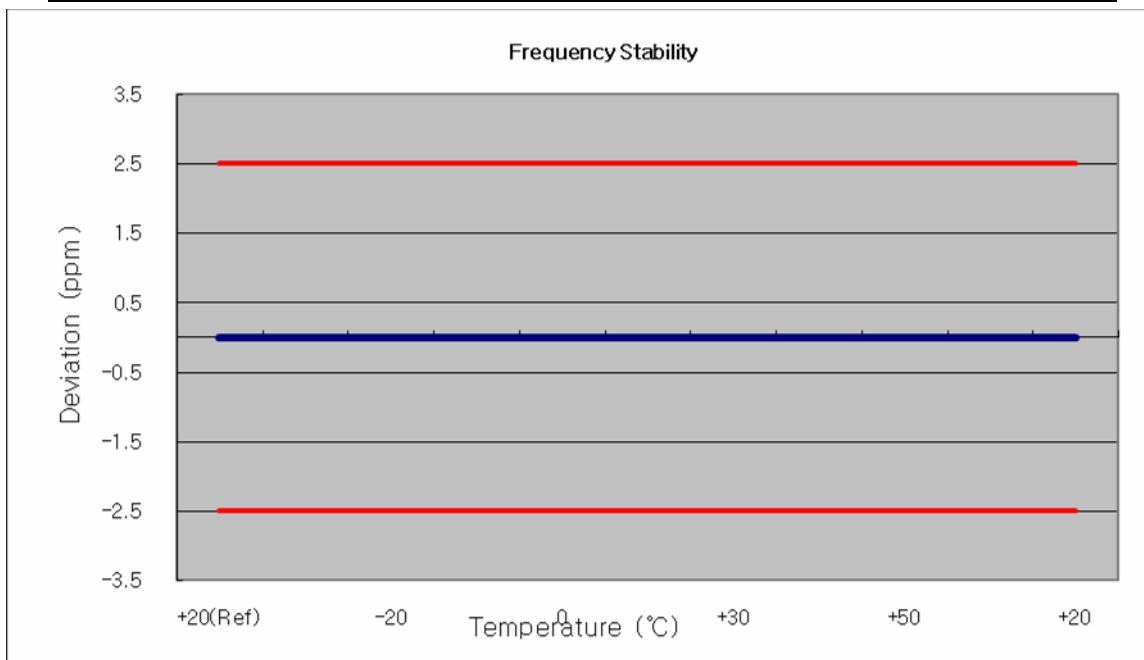


FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21

7.8.4 FREQUENCY STABILITY (WCDMA1900)

OPERATING FREQUENCY: 1,880,000,000 Hz
 CHANNEL: 9400
 REFERENCE VOLTAGE: 3.7 VDC
 DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	1880 000 008	0	0.000 000	0.000
100%		-30	1879 999 991	-9.24	0.000 000	-0.005
100%		-20	1879 999 989	-10.63	-0.000 001	-0.006
100%		-10	1879 999 992	-8.44	0.000 000	-0.004
100%		0	1879 999 991	-9.23	0.000 000	-0.005
100%		+10	1879 999 991	-8.91	0.000 000	-0.005
100%		+30	1879 999 991	-8.79	0.000 000	-0.005
100%		+40	1879 999 988	-12.43	-0.000 001	-0.007
100%		+50	1879 999 991	-8.82	0.000 000	-0.005
115%	4.255	+20	1879 999 991	-8.77	0.000 000	-0.005
Batt. Endpoint	3.400	+20	1879 999 991	-8.71	0.000 000	-0.005



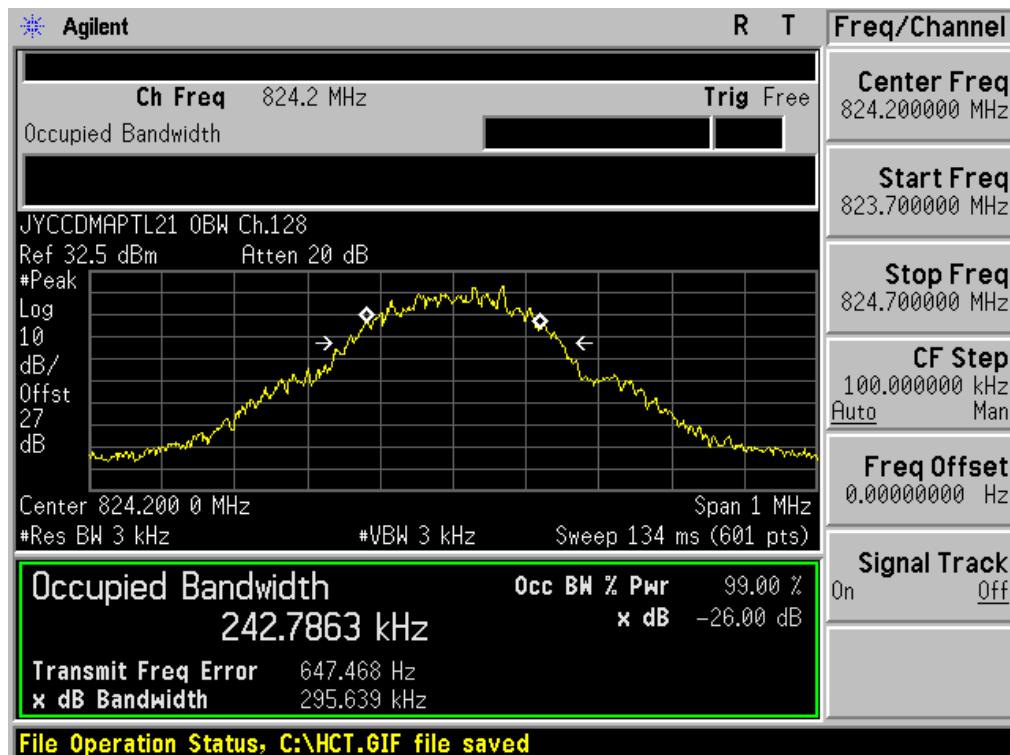
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Test Report No.	Date of Issue:	EUT Type:		
HCTR1208FR13	August 14, 2012	GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC		FCC ID: JYCCDMAPTL21



8. TEST PLOTS

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21

■ GSM850 MODE (128 CH.) Occupied Bandwidth



■ GSM850 MODE (190 CH.) Occupied Bandwidth

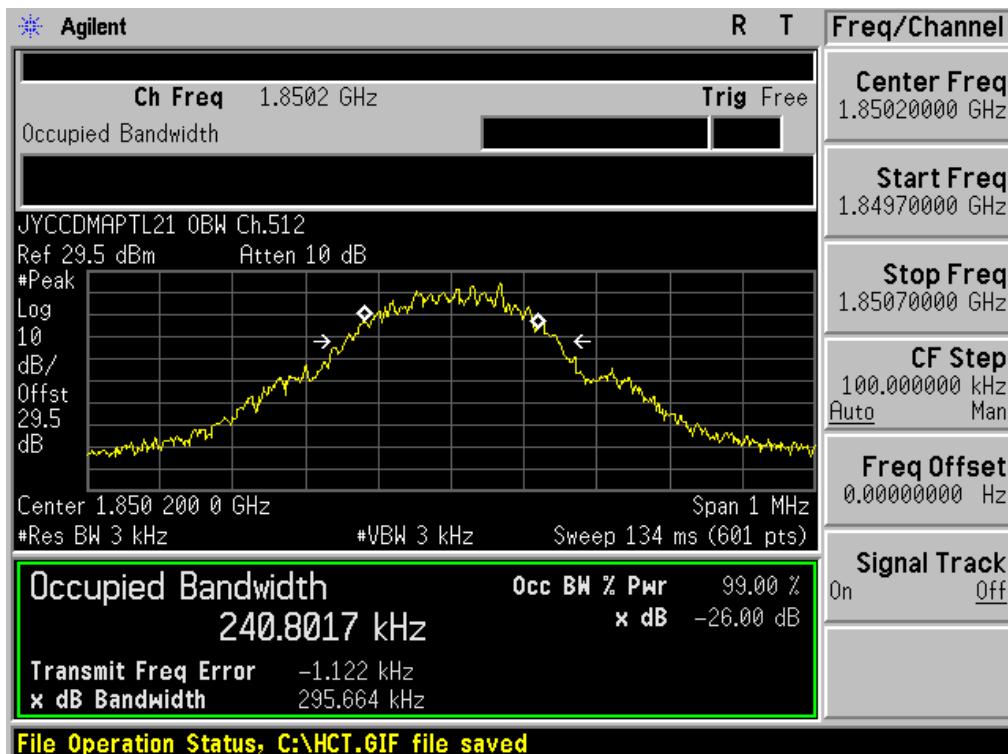


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ GSM850 MODE (251 CH.) Occupied Bandwidth



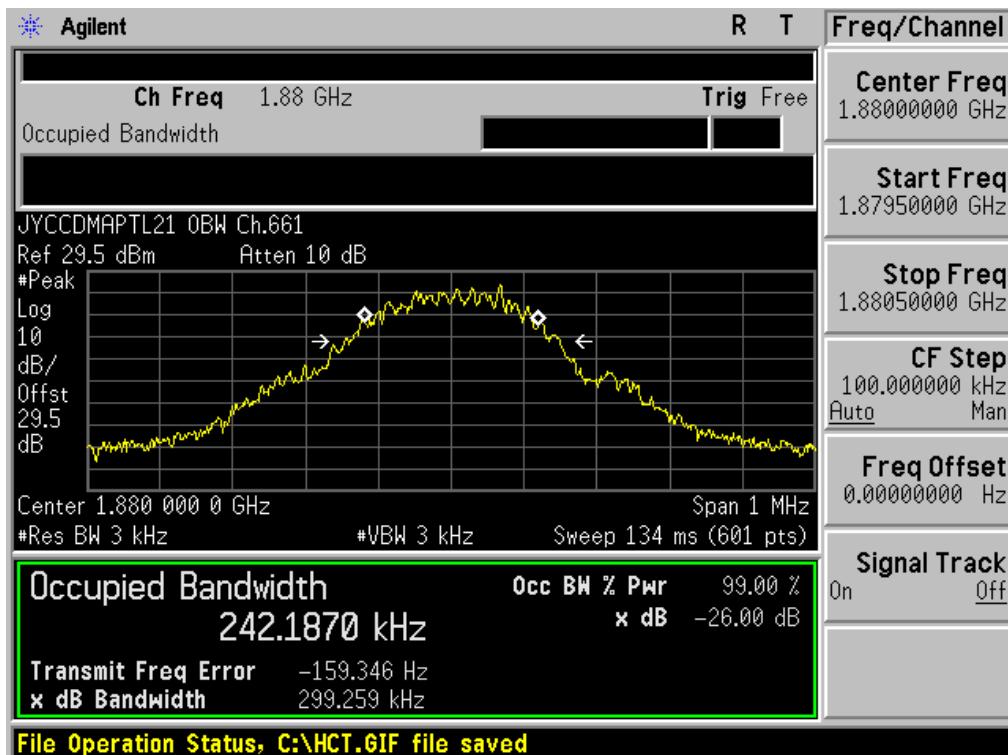
■ GSM1900 MODE (512 CH.) Occupied Bandwidth



FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ GSM1900 MODE (661 CH.) Occupied Bandwidth

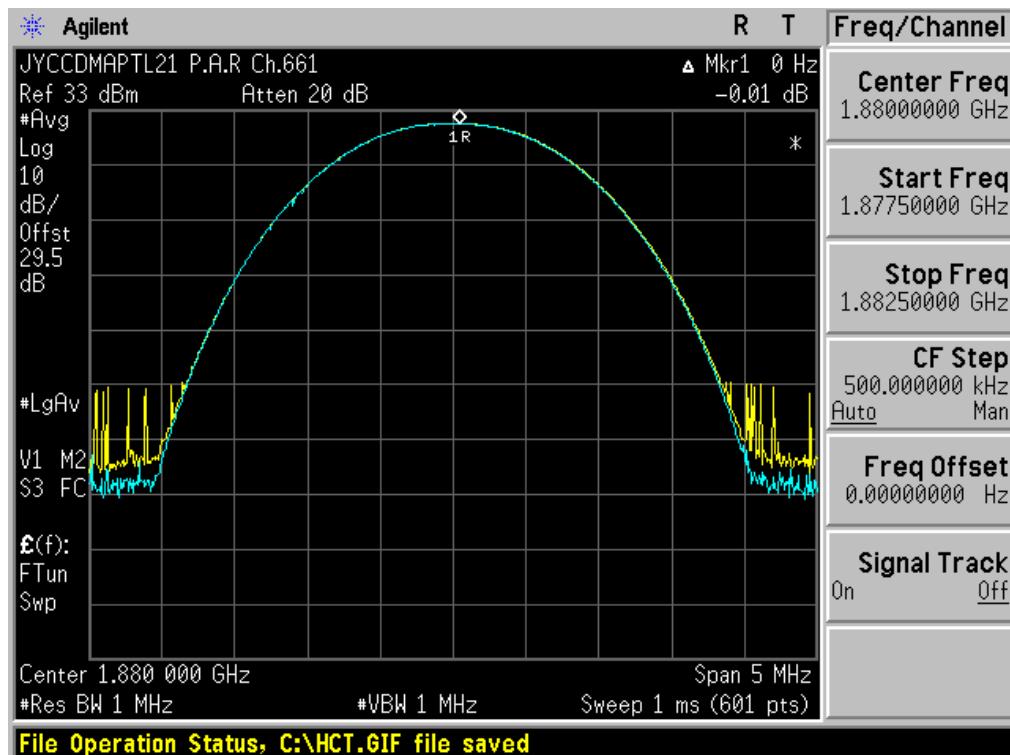


■ GSM1900 MODE (810 CH.) Occupied Bandwidth

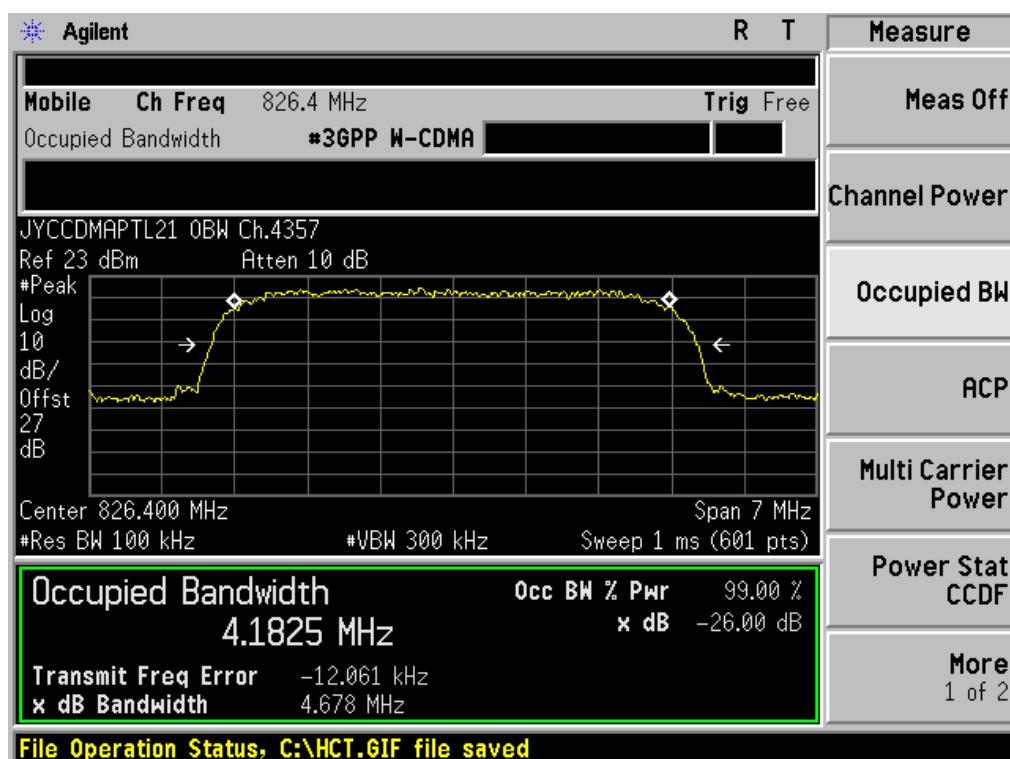


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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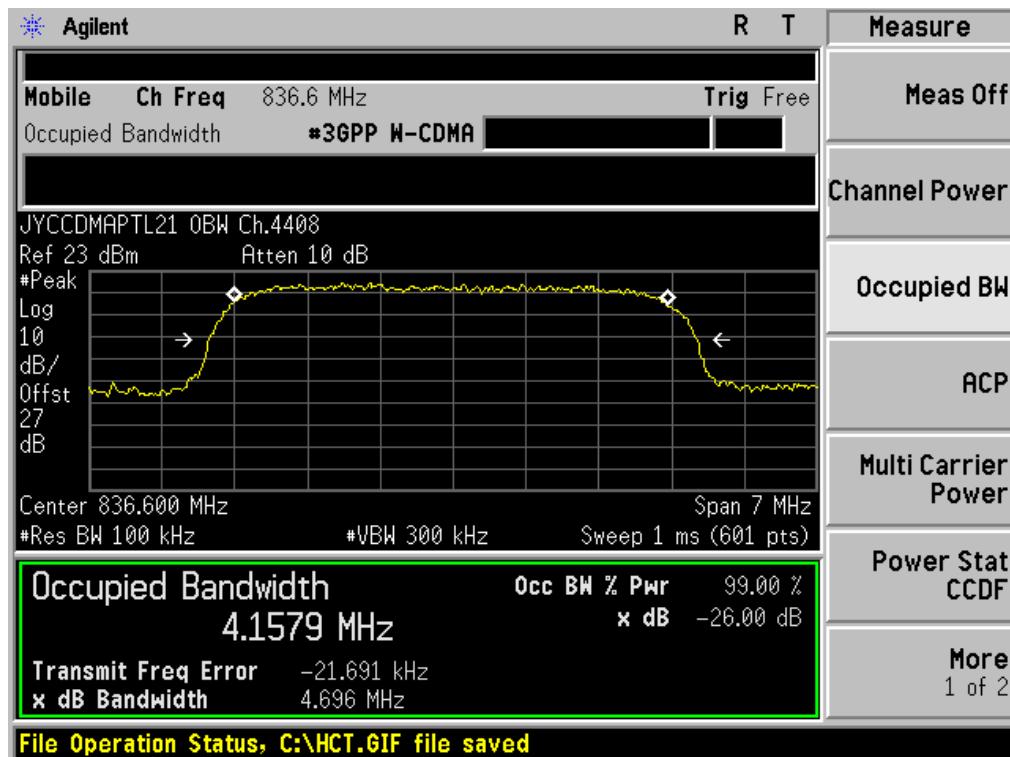
■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio



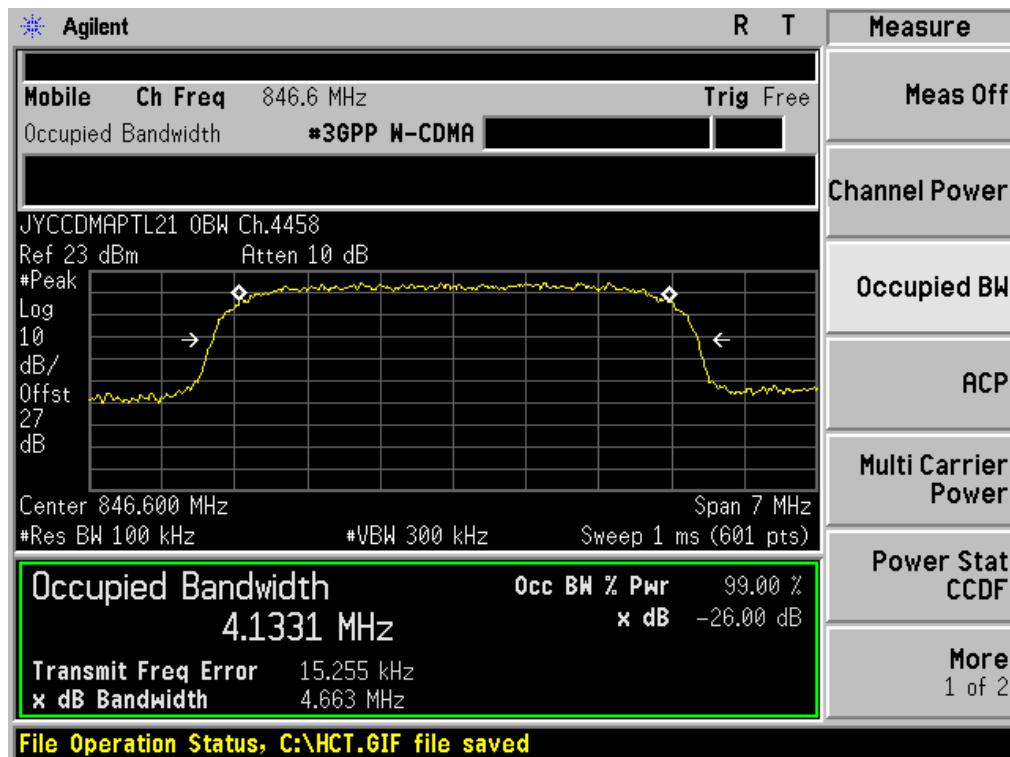
■ WCDMA850 MODE (4132 CH.) Occupied Bandwidth



■ WCDMA850 MODE (4183 CH.) Occupied Bandwidth



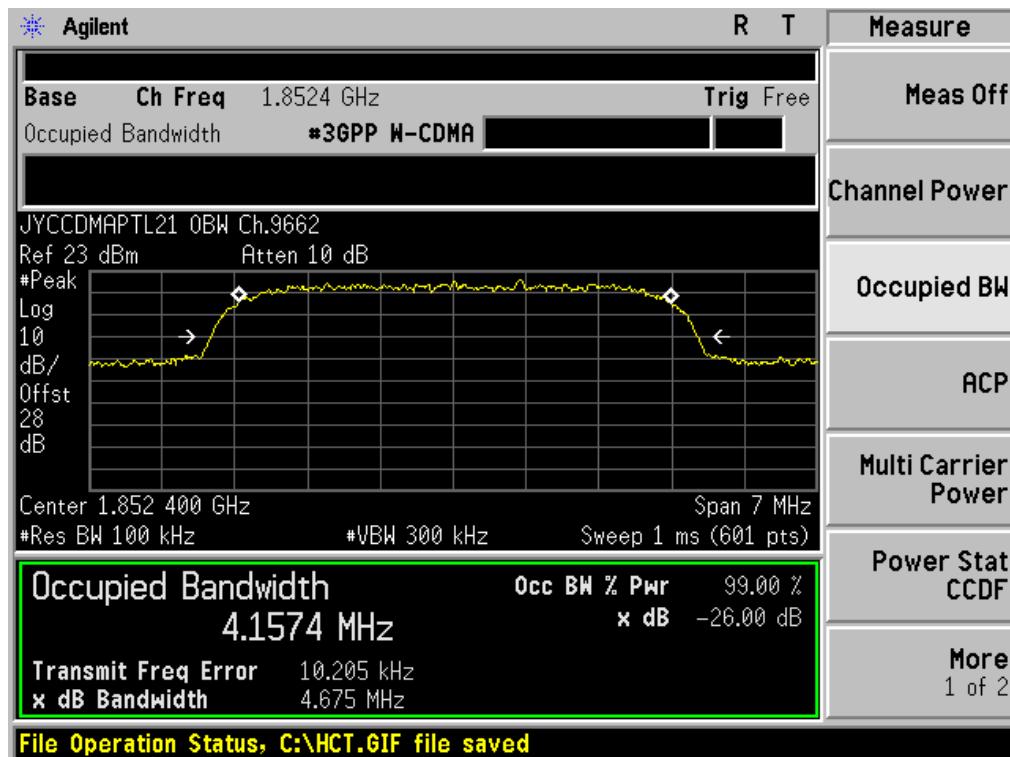
■ WCDMA850 MODE (4233 CH.) Occupied Bandwidth



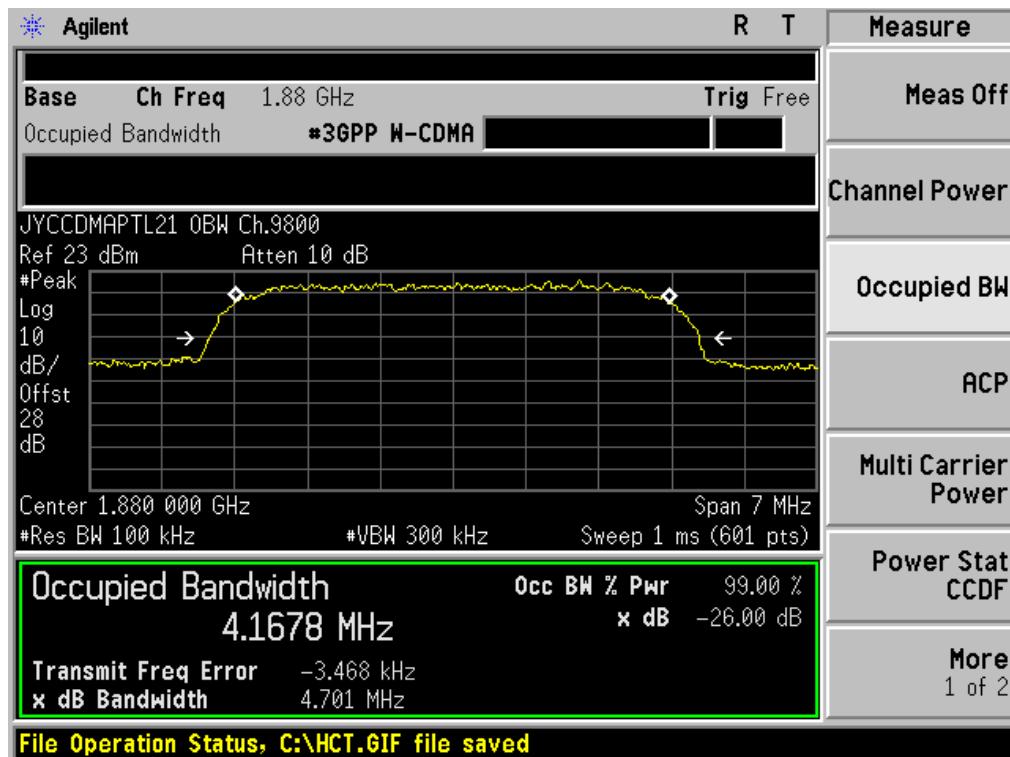
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ WCDMA1900 MODE (9262 CH.) Occupied Bandwidth

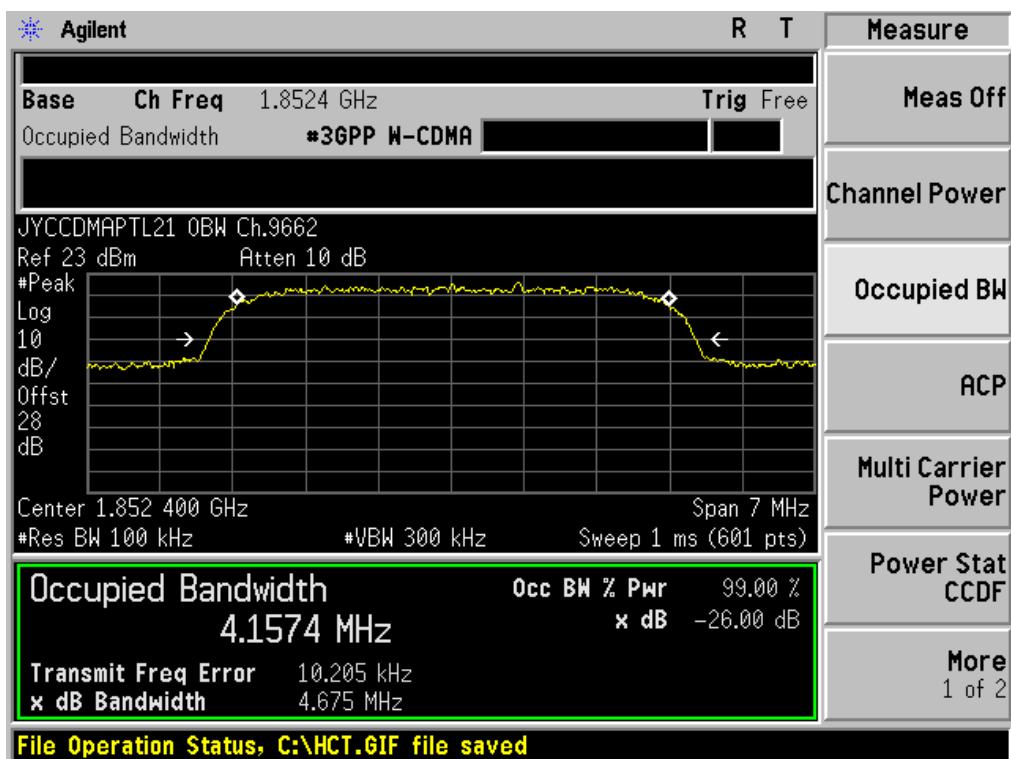


■ WCDMA1900 MODE (9400 CH.) Occupied Bandwidth

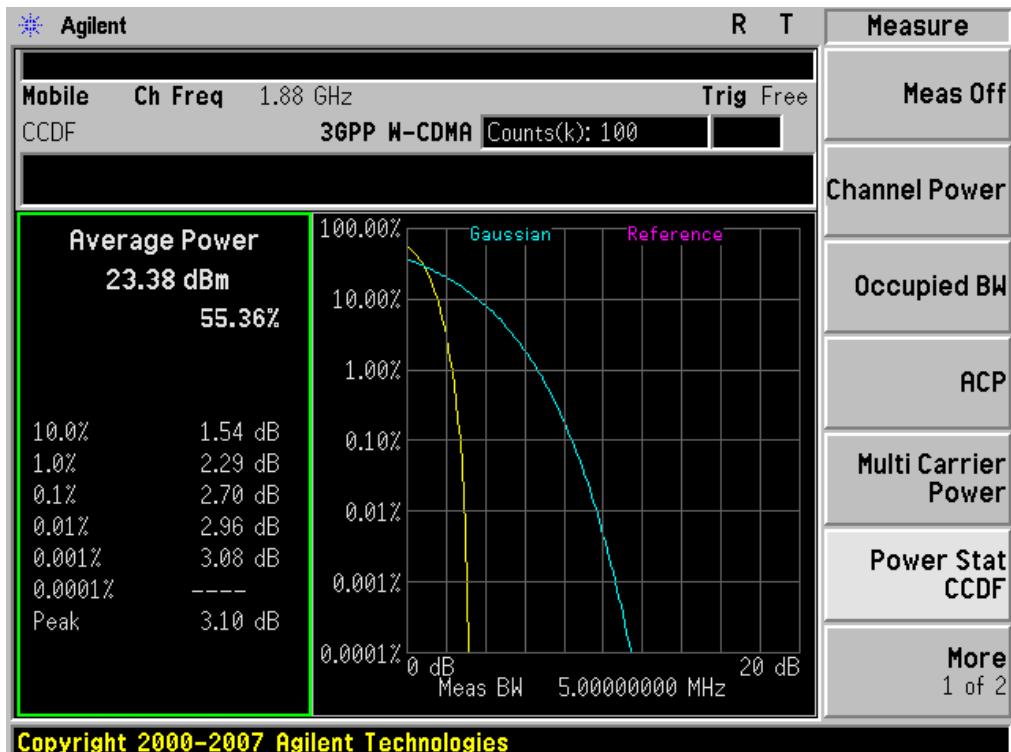


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ WCDMA1900 MODE (9538 CH.) Occupied Bandwidth

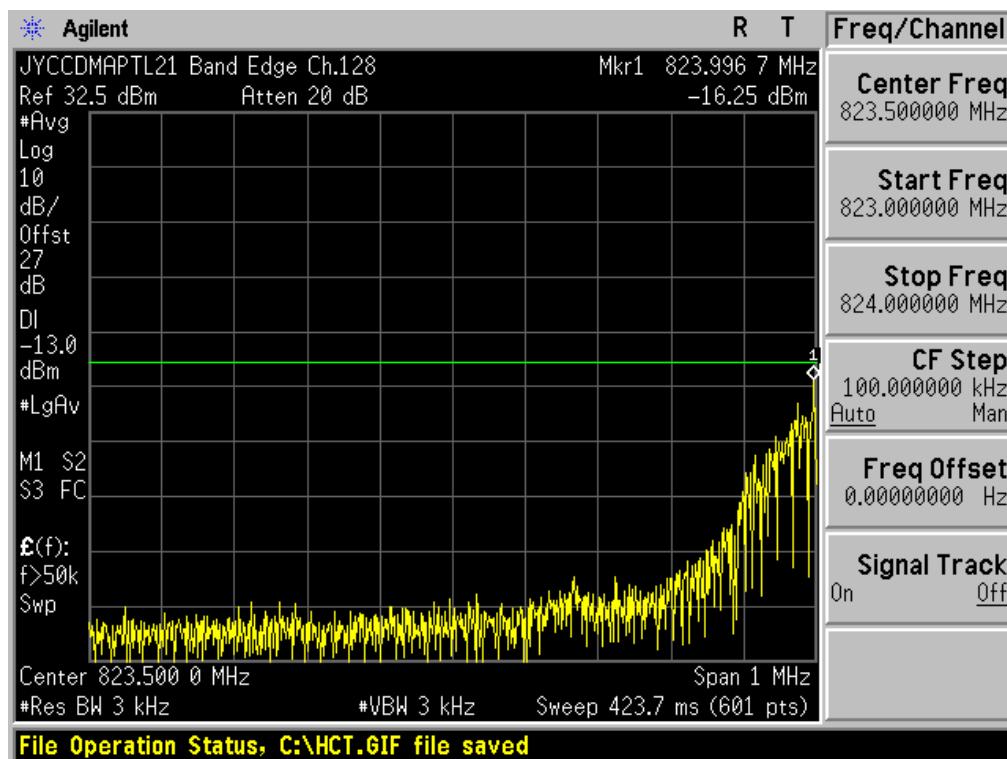


■ WCDMA1900 MODE (9400 CH.) Peak-to-Average Ratio

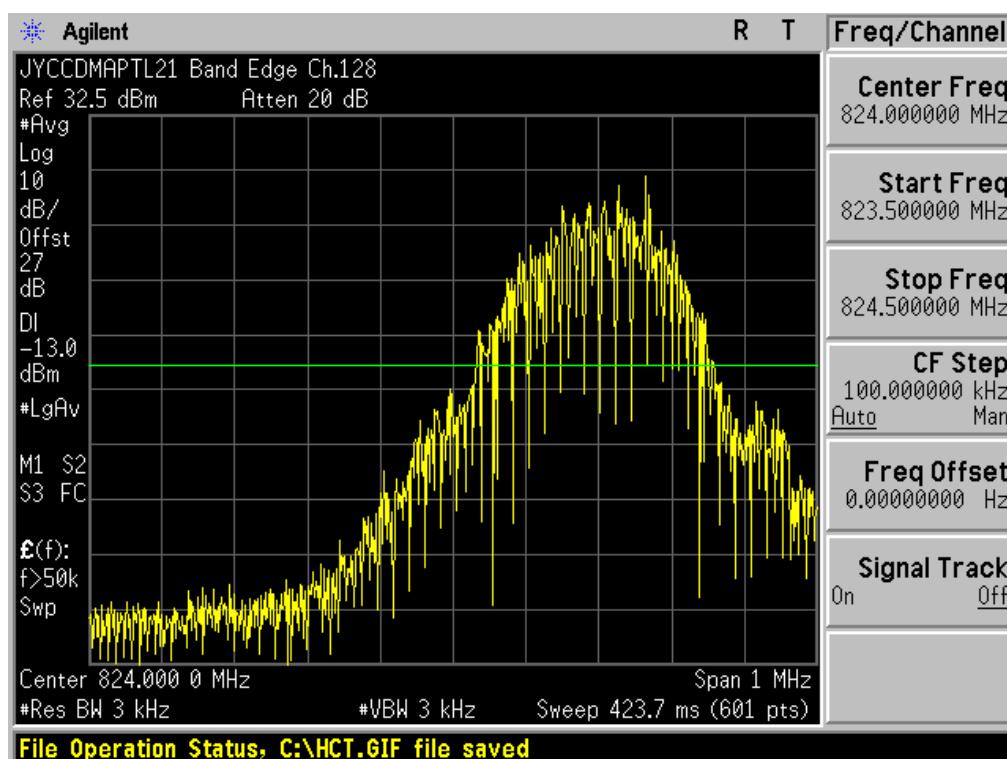


FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21

■ GSM850 MODE (128 CH.) Block Edge 1



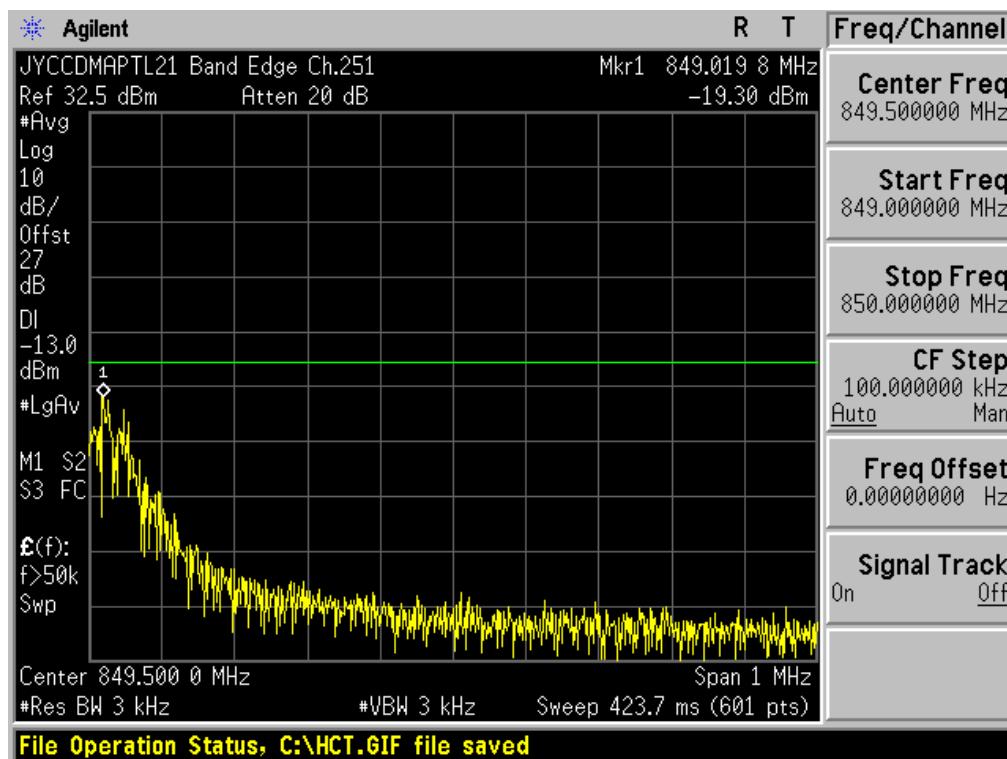
■ GSM850 MODE (128 CH.) Block Edge 2



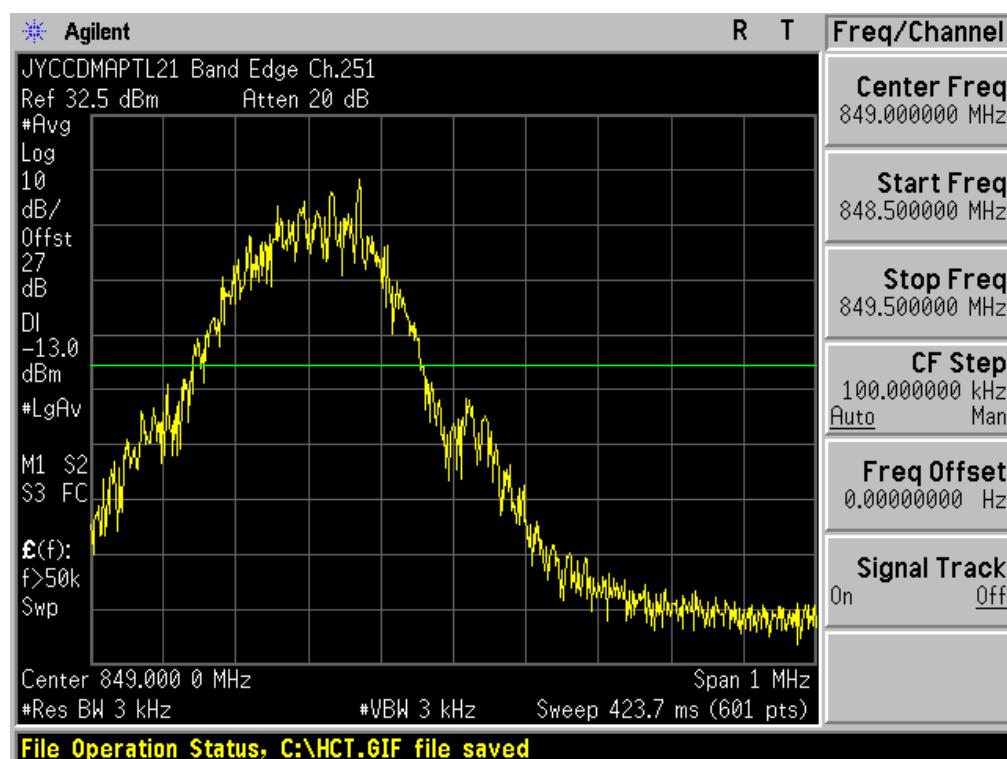
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ GSM850 MODE (251 CH.) Block Edge 1



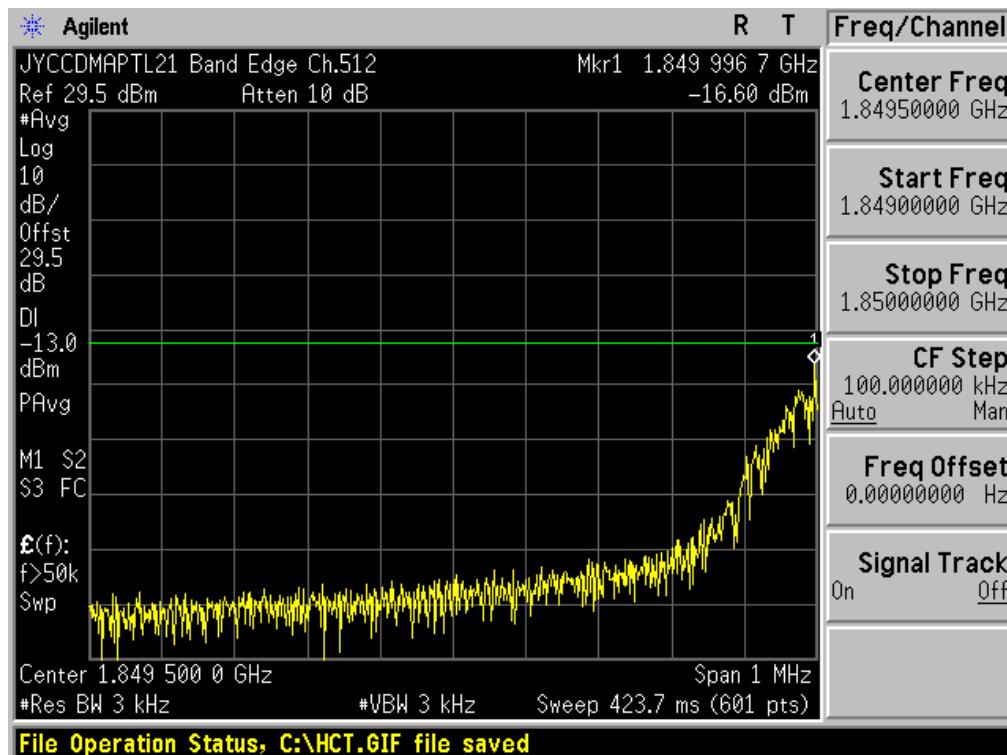
■ GSM850 MODE (251 CH.) Block Edge 2



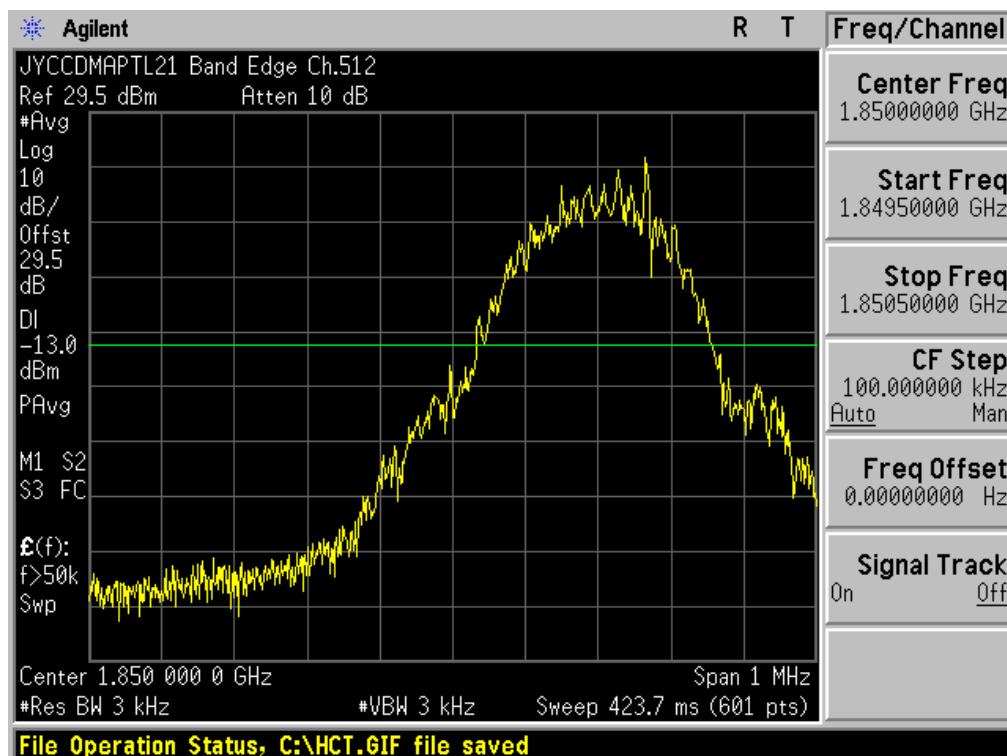
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ GSM1900 MODE (512 CH.) Block Edge 1



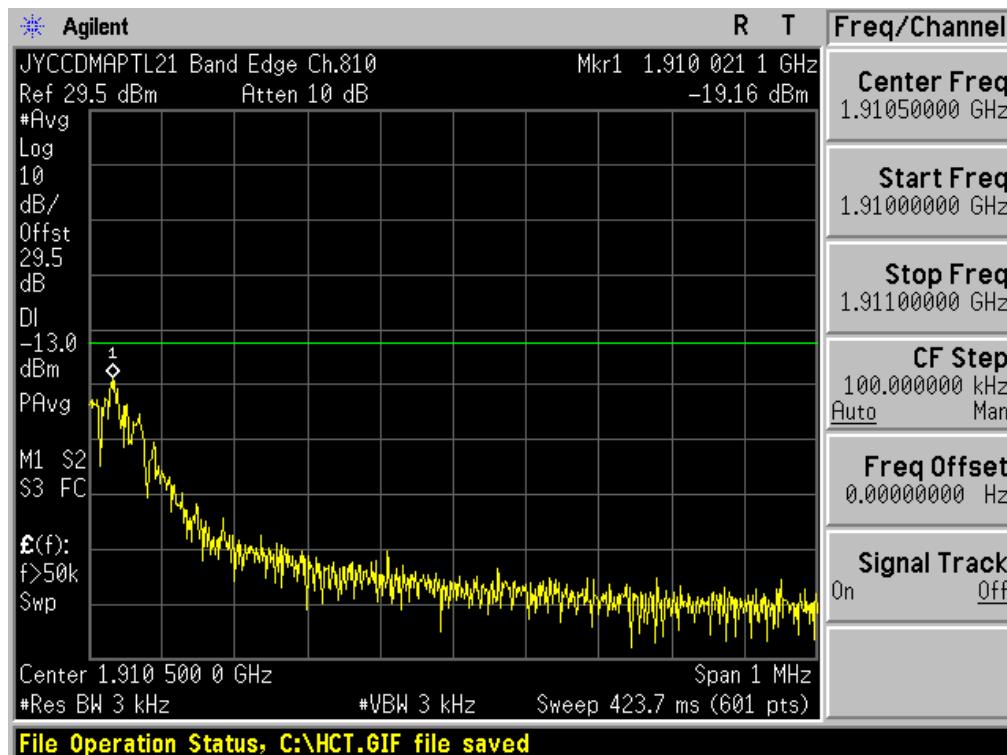
■ GSM1900 MODE (512 CH.) Block Edge 2



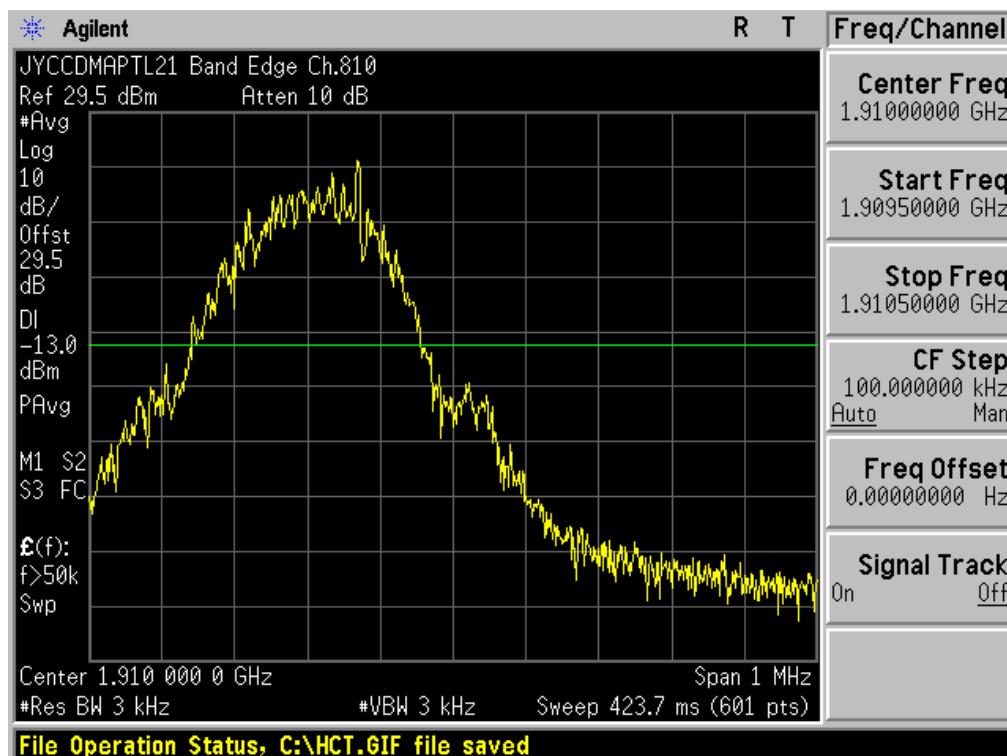
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ GSM1900 MODE (810 CH.) Block Edge 1



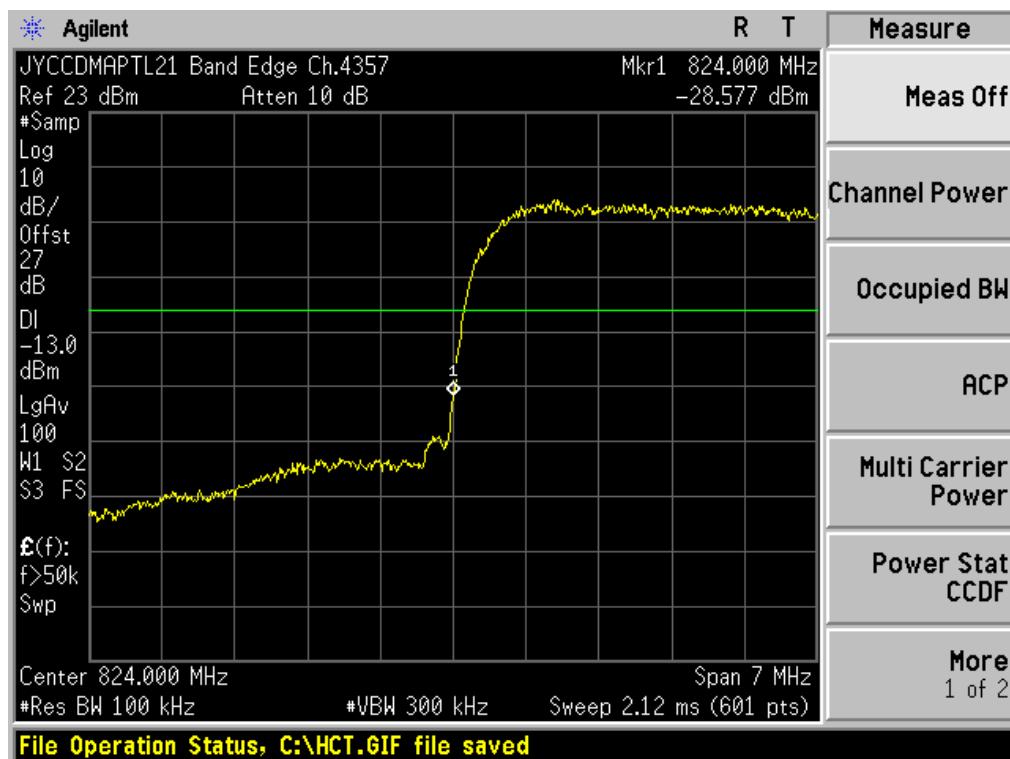
■ GSM1900 MODE (810 CH.) Block Edge 2



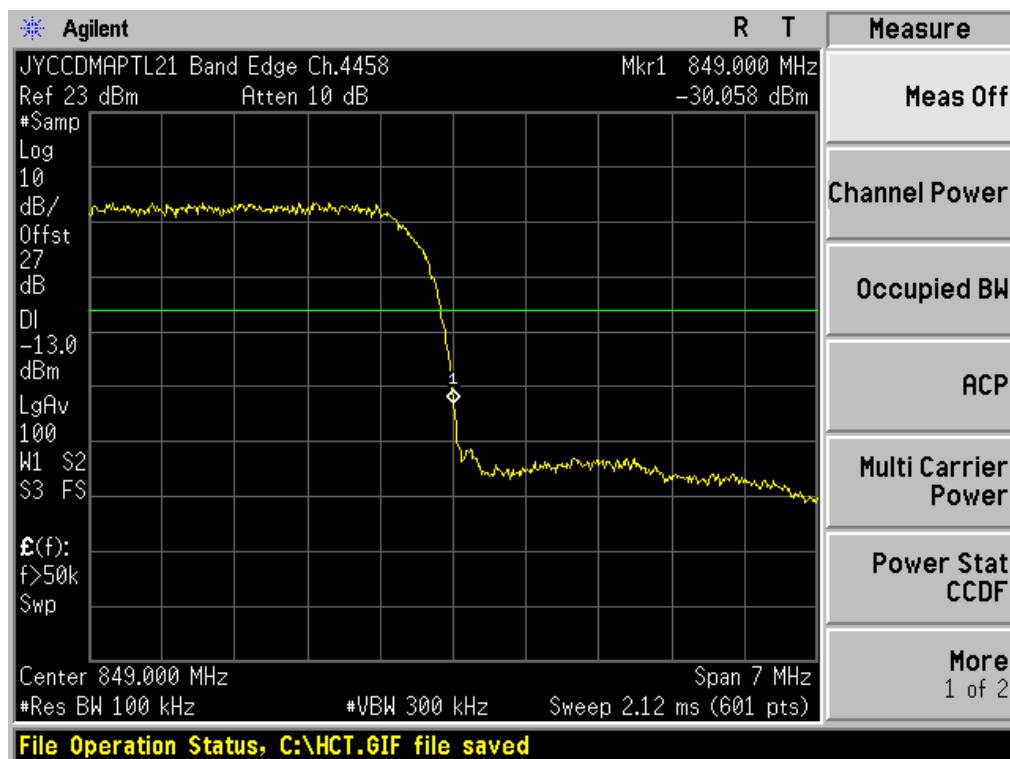
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ WCDMA850 MODE (4132 CH.) Block Edge



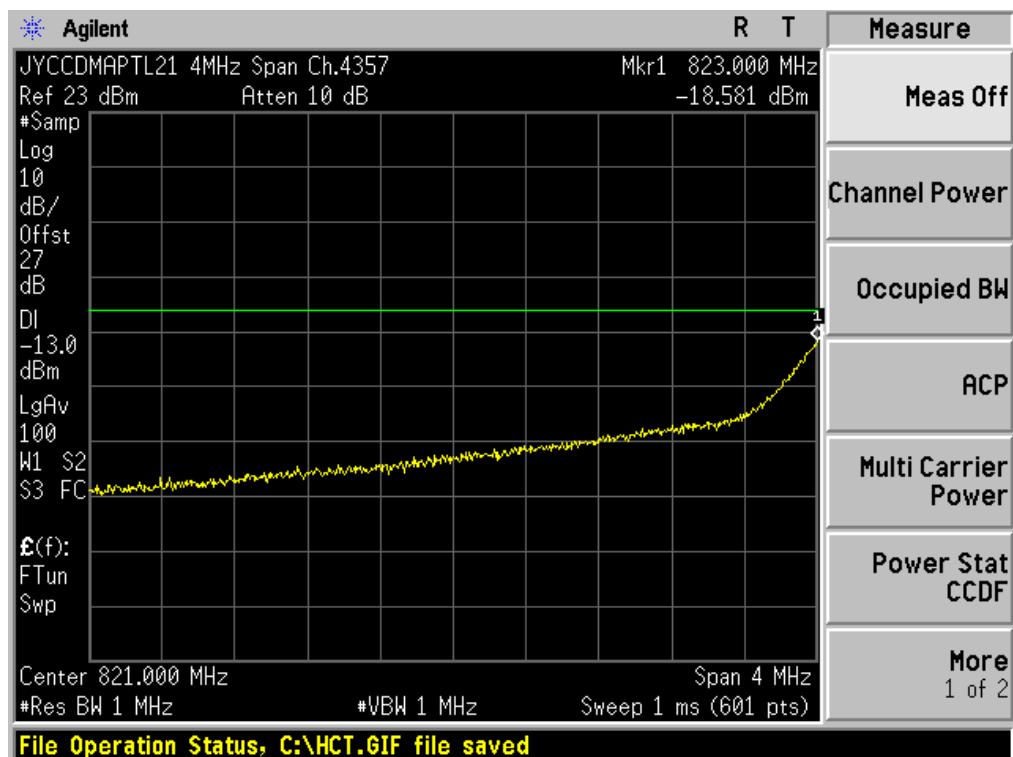
■ WCDMA850 MODE (4233 CH.) Block Edge



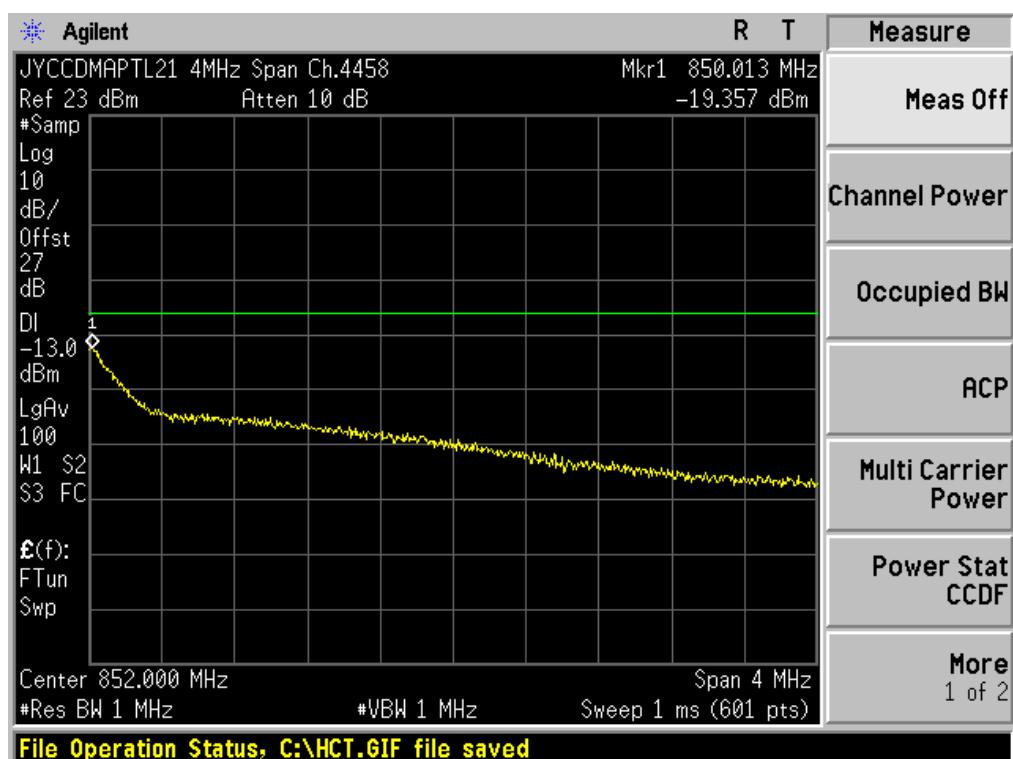
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ WCDMA850 MODE (4132 CH.) – 4 MHz Span

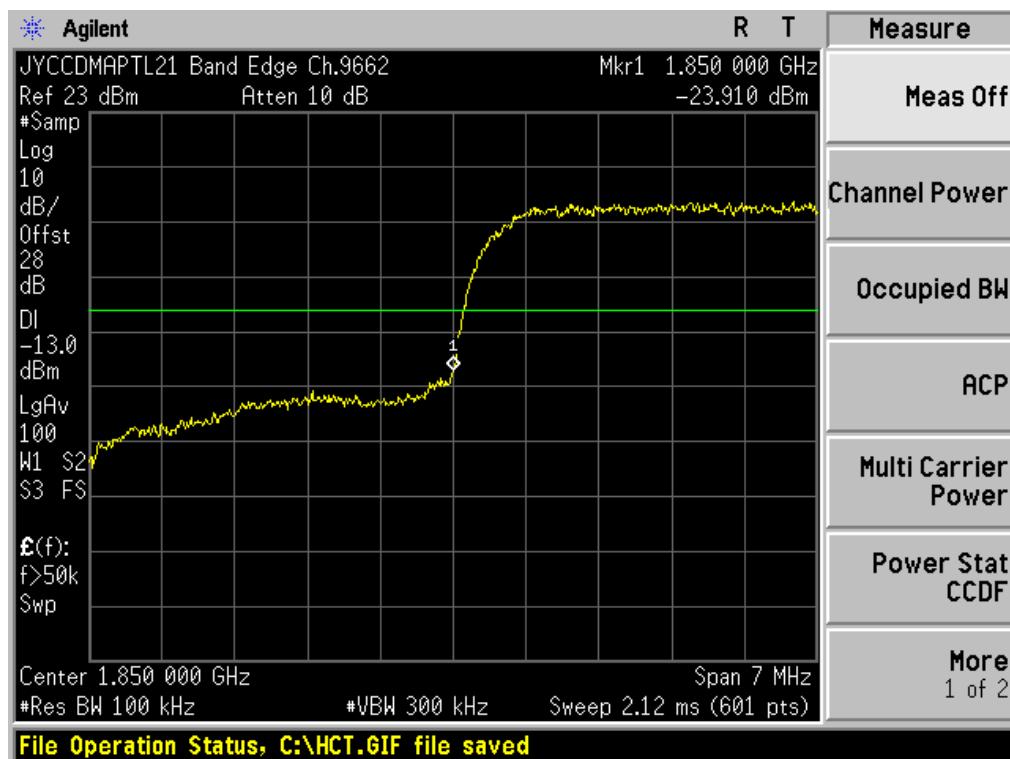


■ WCDMA850 MODE (4233 CH.) – 4 MHz Span

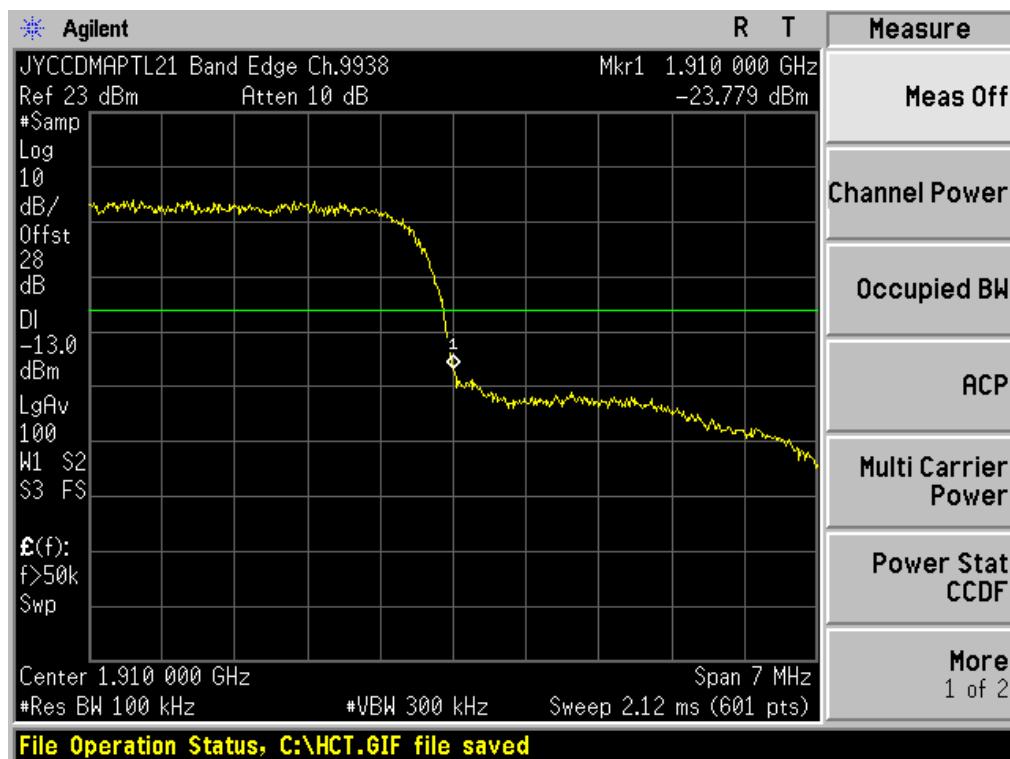


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ WCDMA1900 MODE (9262 CH.) Block Edge



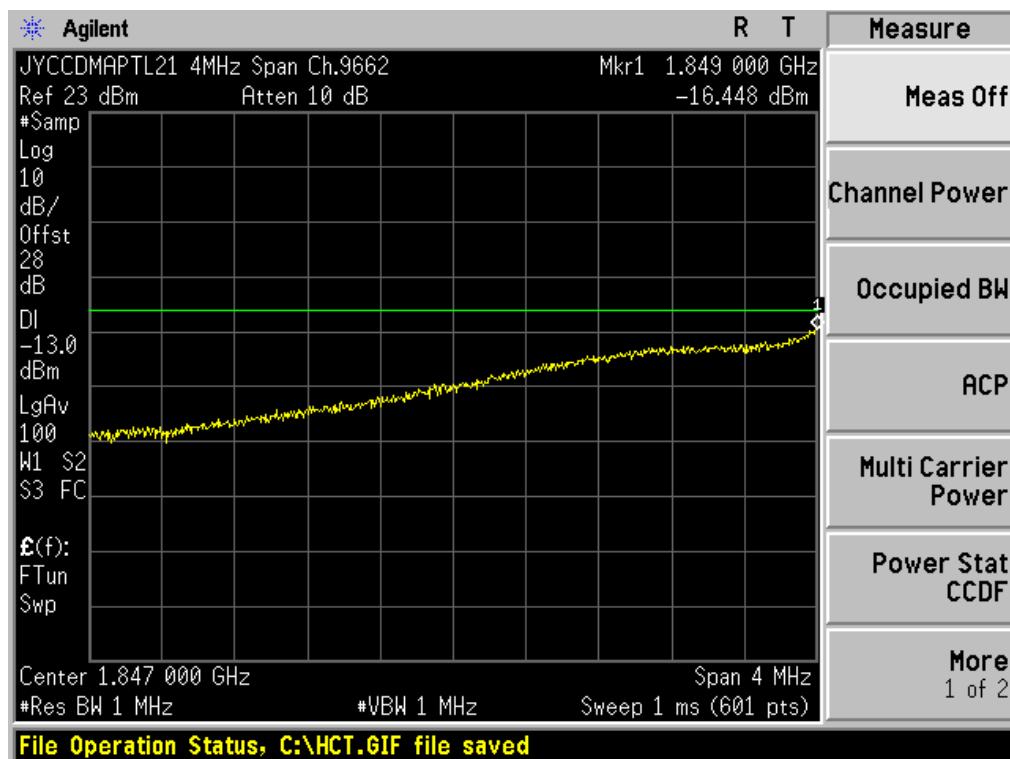
■ WCDMA1900 MODE (9538 CH.) Block Edge



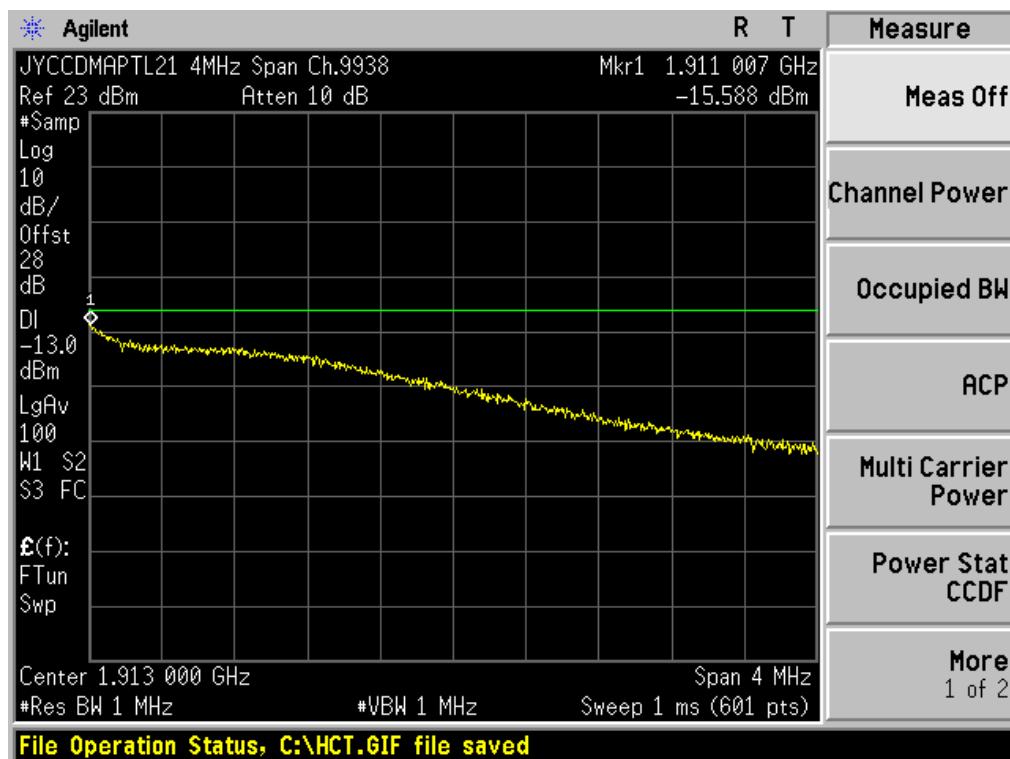
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

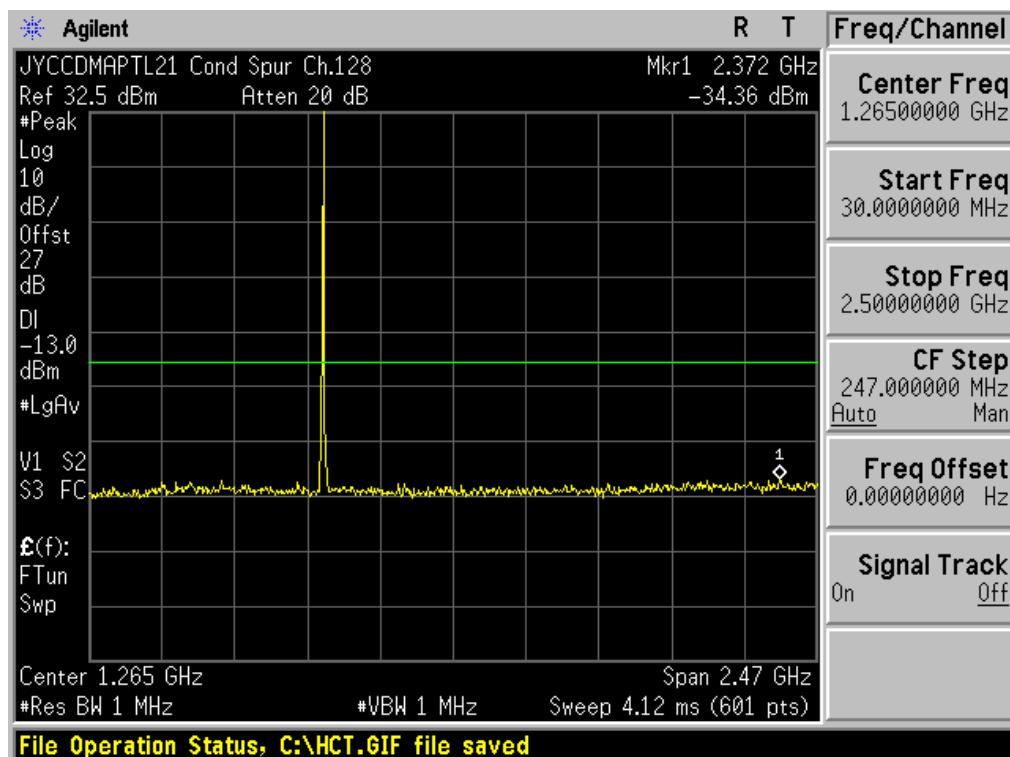
■ WCDMA1900 MODE (9262 CH.) – 4 MHz Span



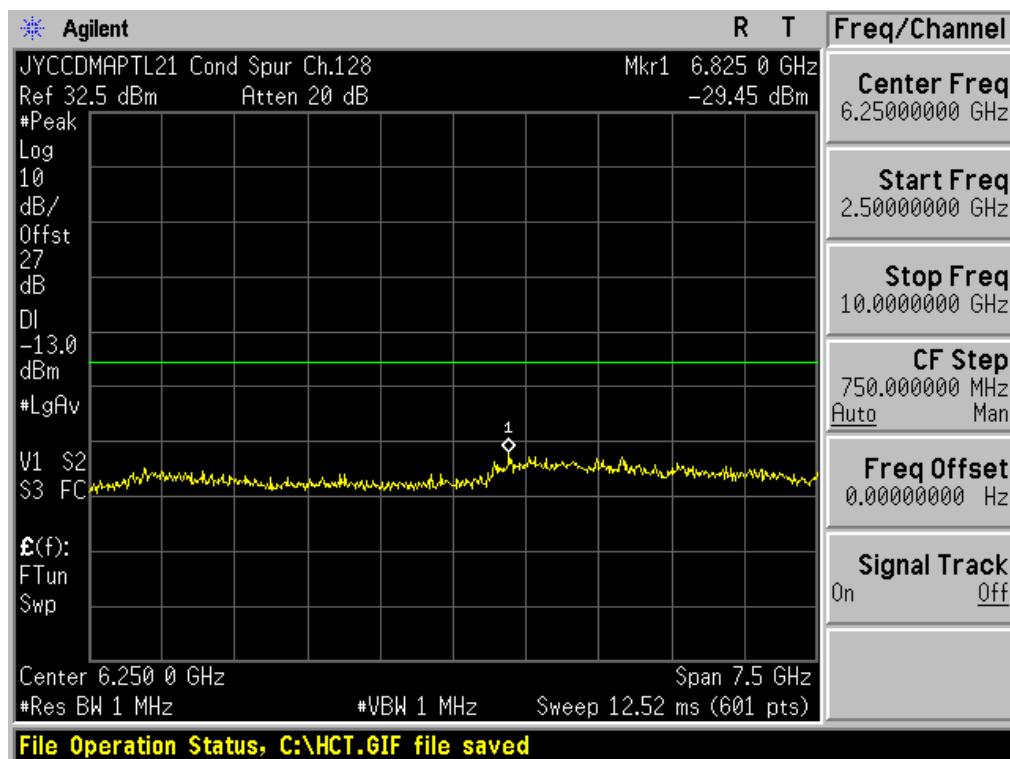
■ WCDMA1900 MODE (9538 CH.) – 4 MHz Span



■ GSM850 MODE (128 CH.) Conducted Spurious Emissions1

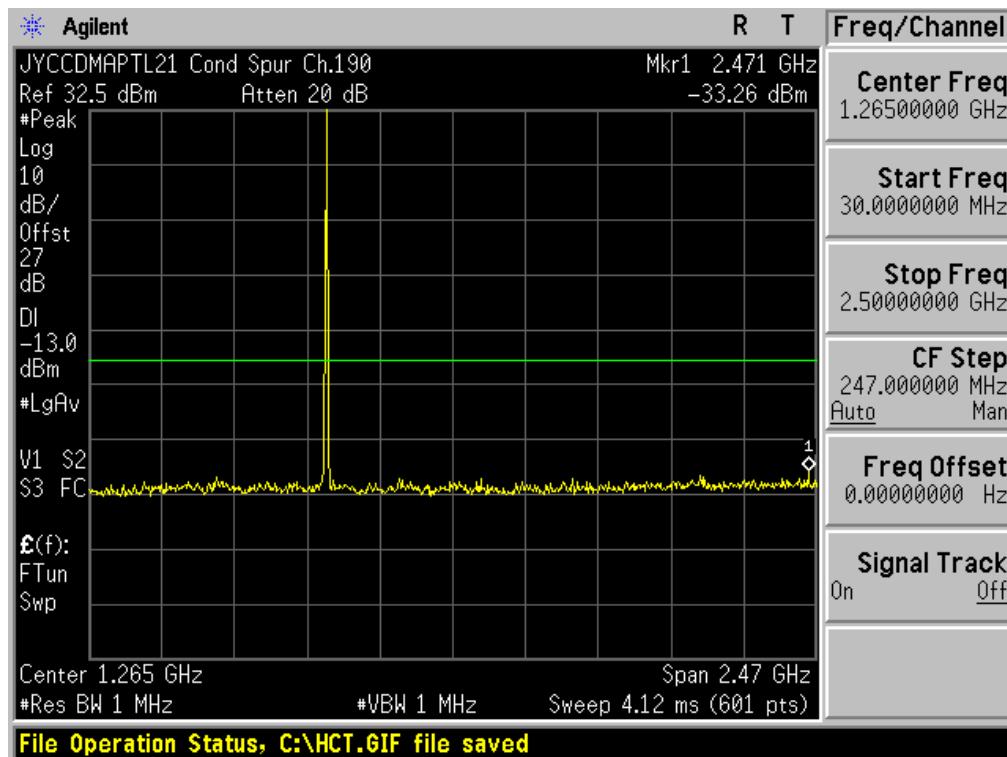


■ GSM850 MODE (128 CH.) Conducted Spurious Emissions2

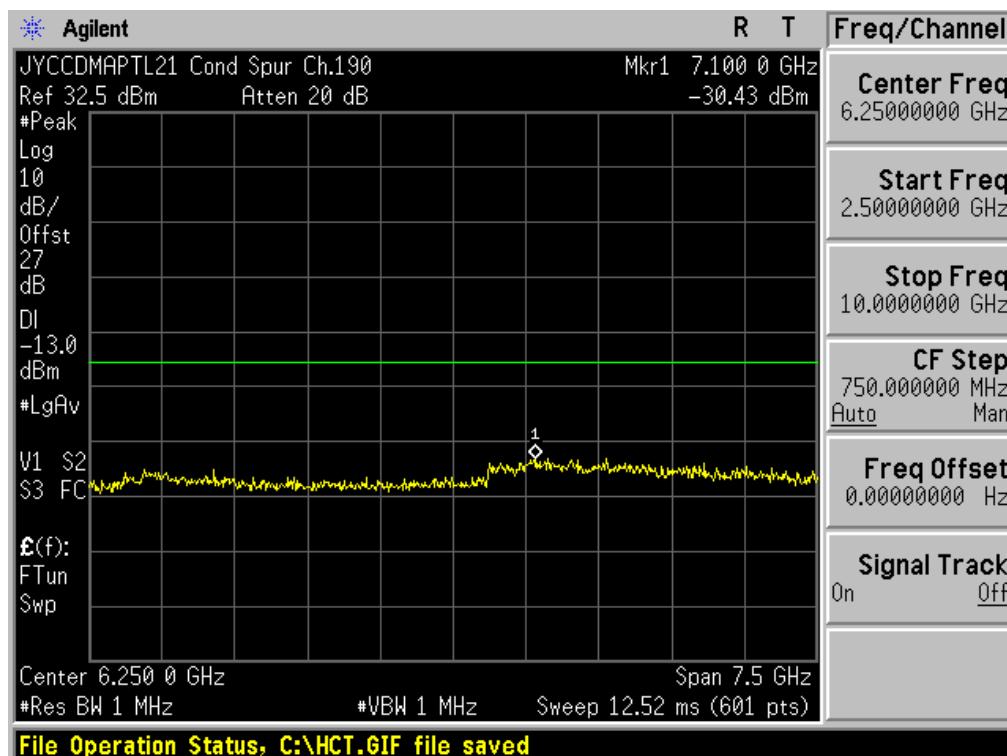


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ GSM850 MODE (190 CH.) Conducted Spurious Emissions1

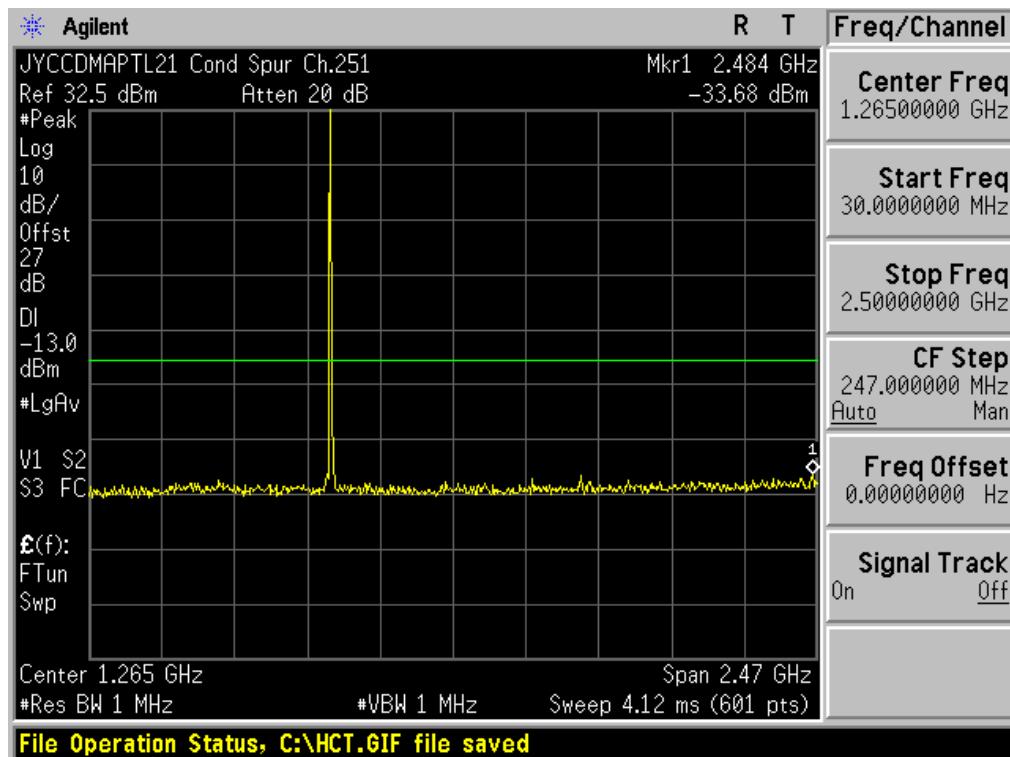


■ GSM850 MODE (190 CH.) Conducted Spurious Emissions2

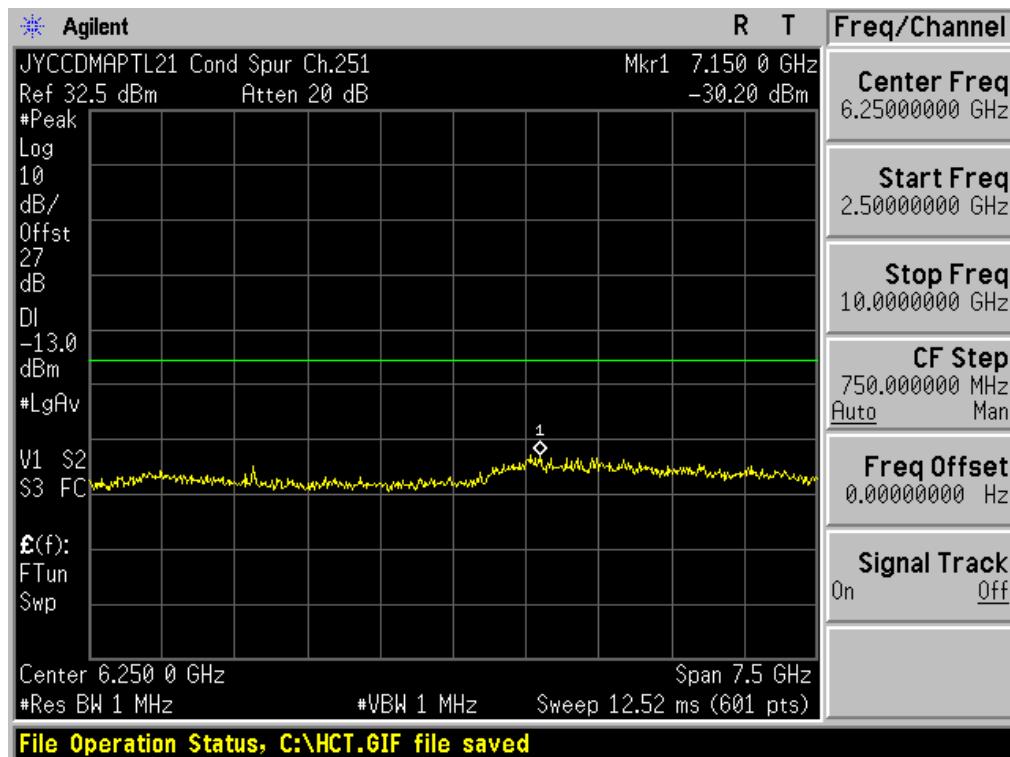


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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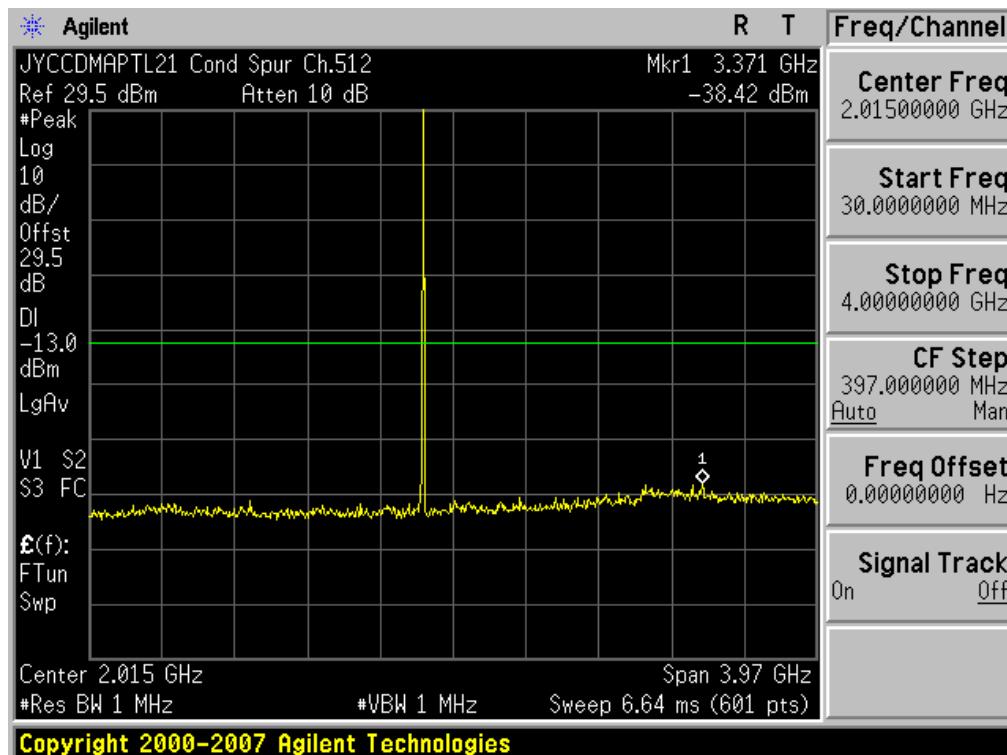
■ GSM850 MODE (251 CH.) Conducted Spurious Emissions1



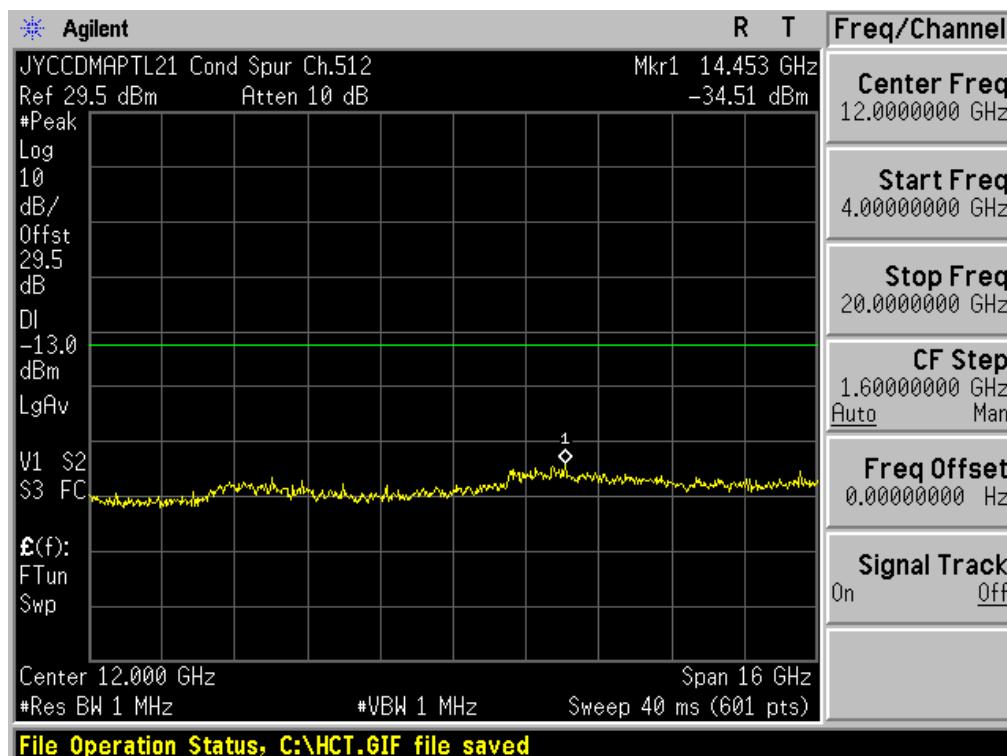
■ GSM850 MODE (251 CH.) Conducted Spurious Emissions2



■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions1

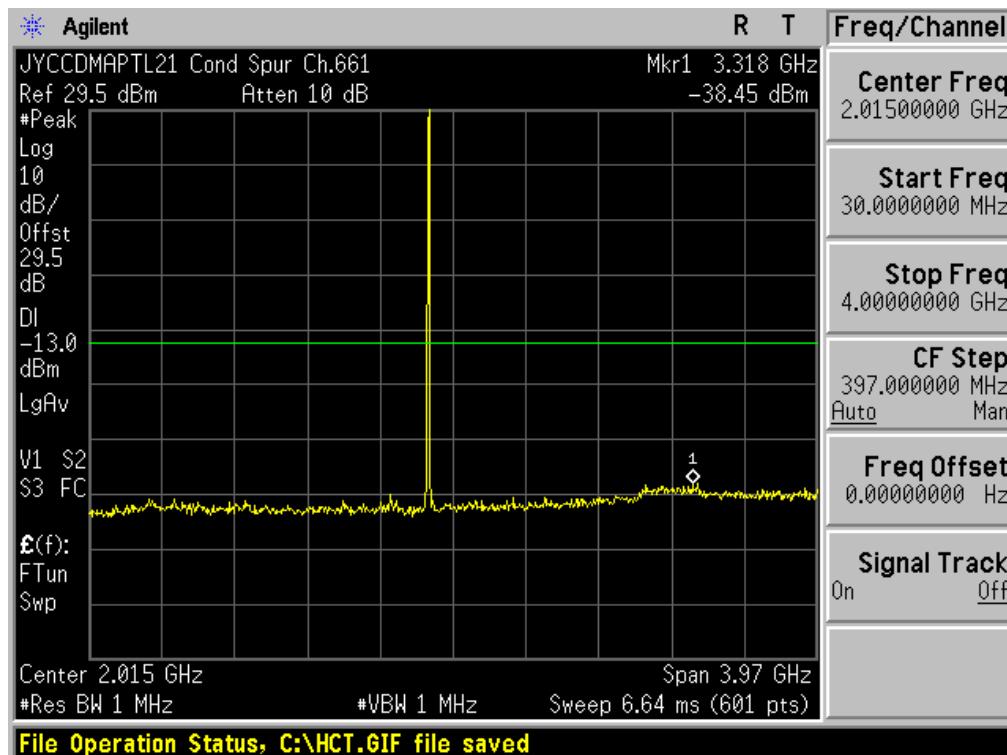


■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions2

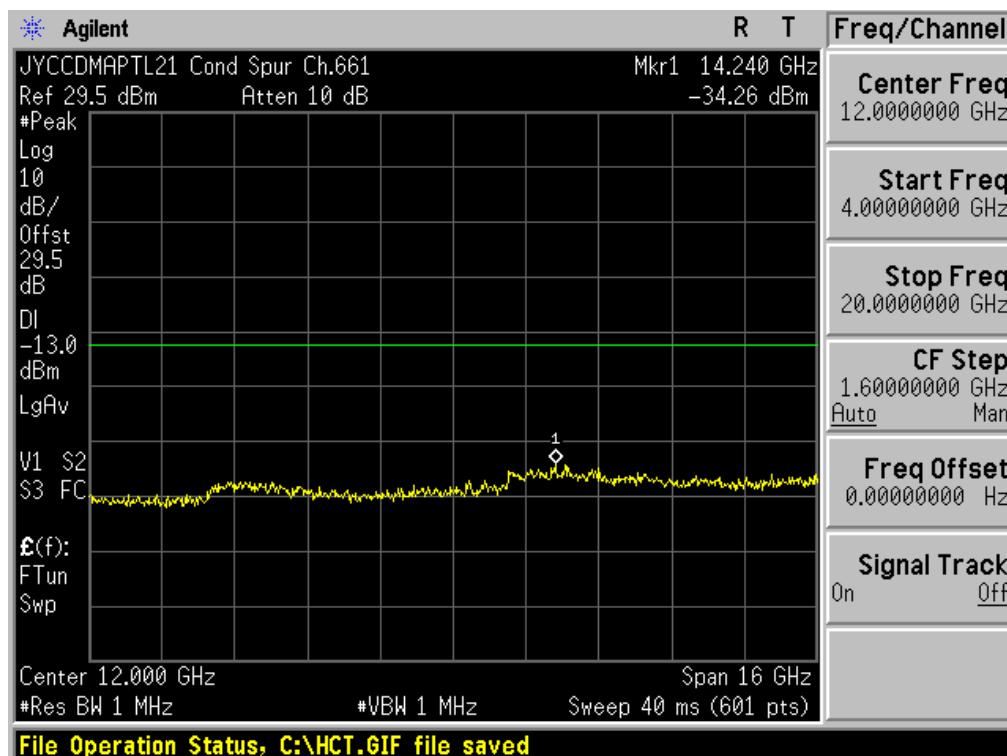


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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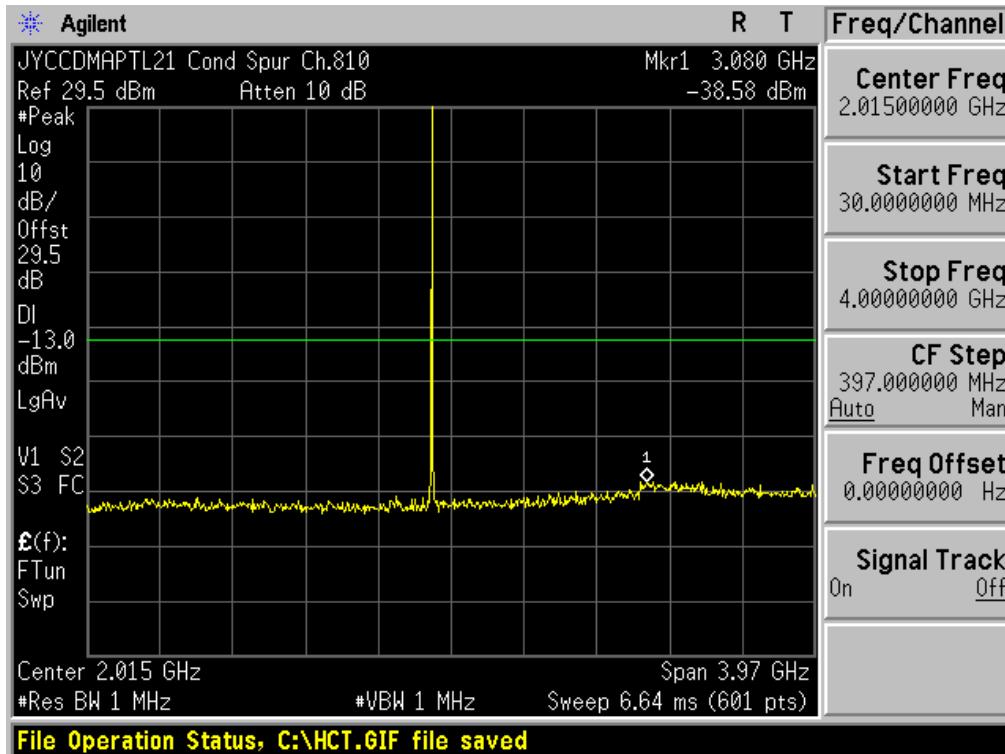
■ GSM1900 MODE (661 CH) Conducted Spurious Emissions1



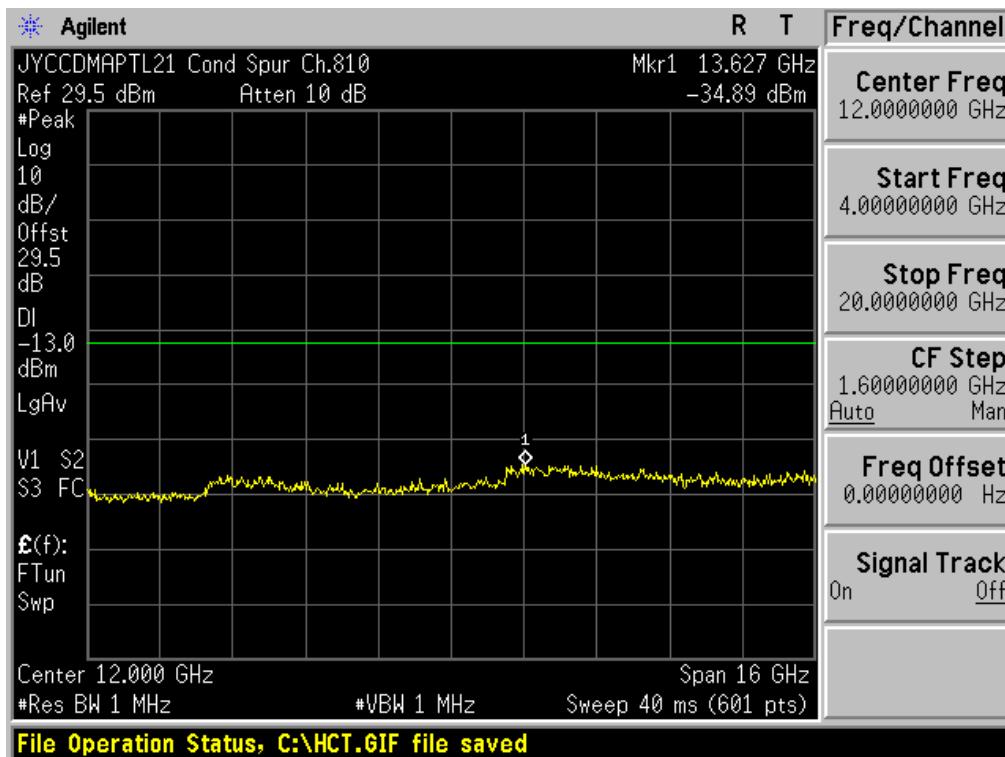
■ GSM1900 MODE (661 CH.) Conducted Spurious Emissions2



■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions1

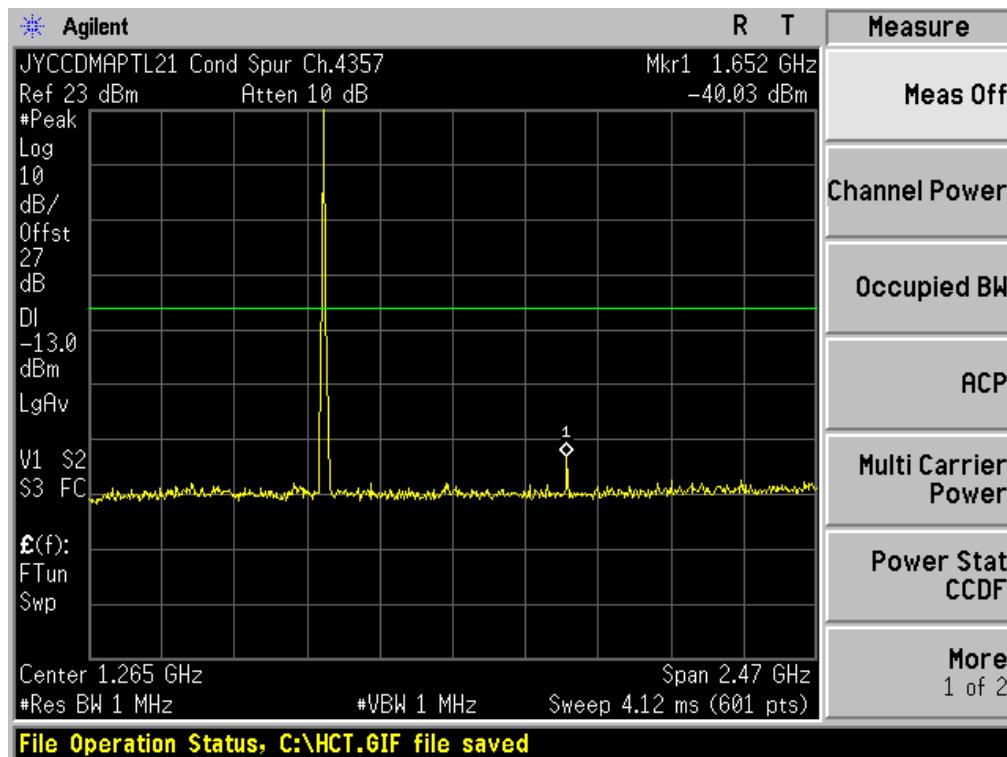


■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions2

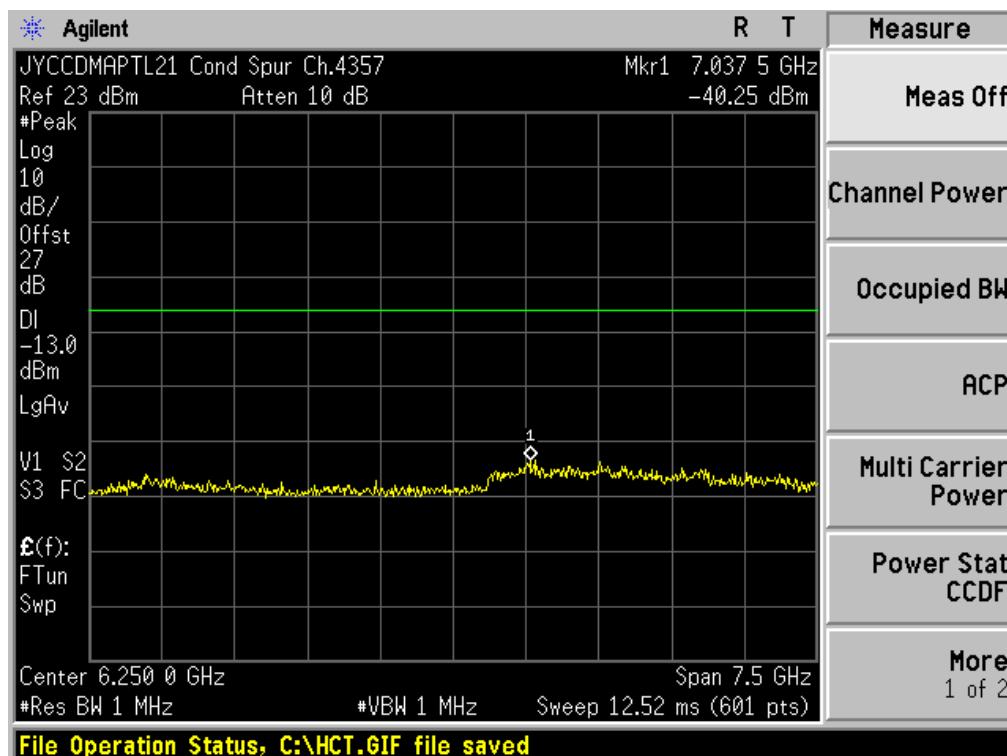


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ WCDMA850 MODE (4132 CH.) Conducted Spurious Emissions1

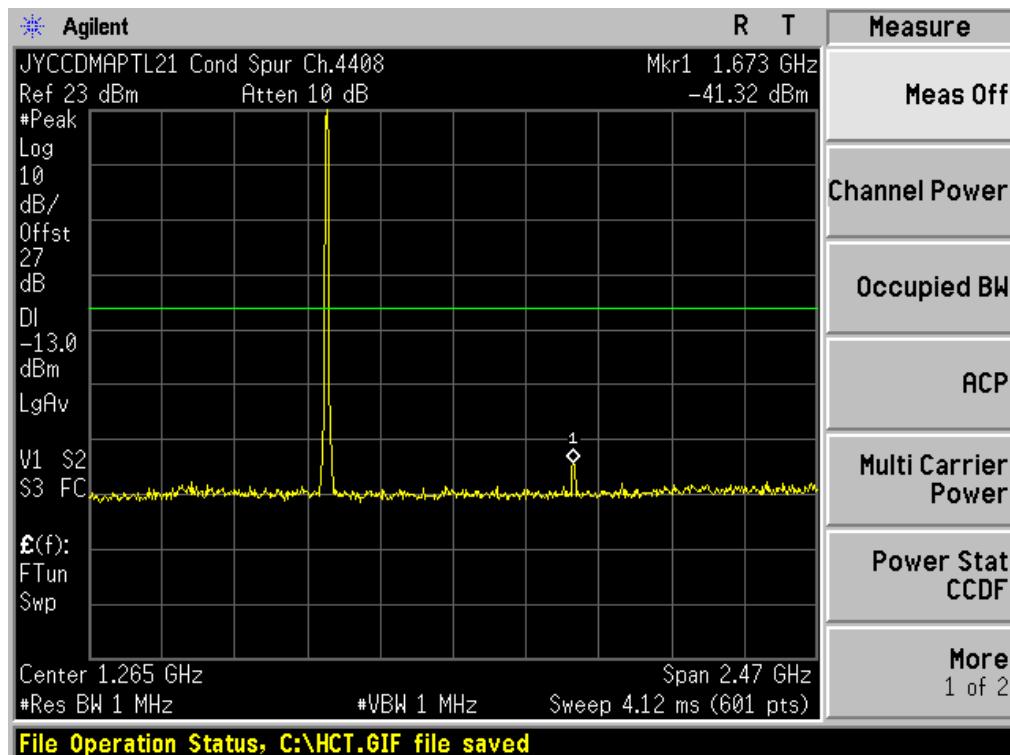


■ WCDMA850 MODE (4132 CH.) Conducted Spurious Emissions2

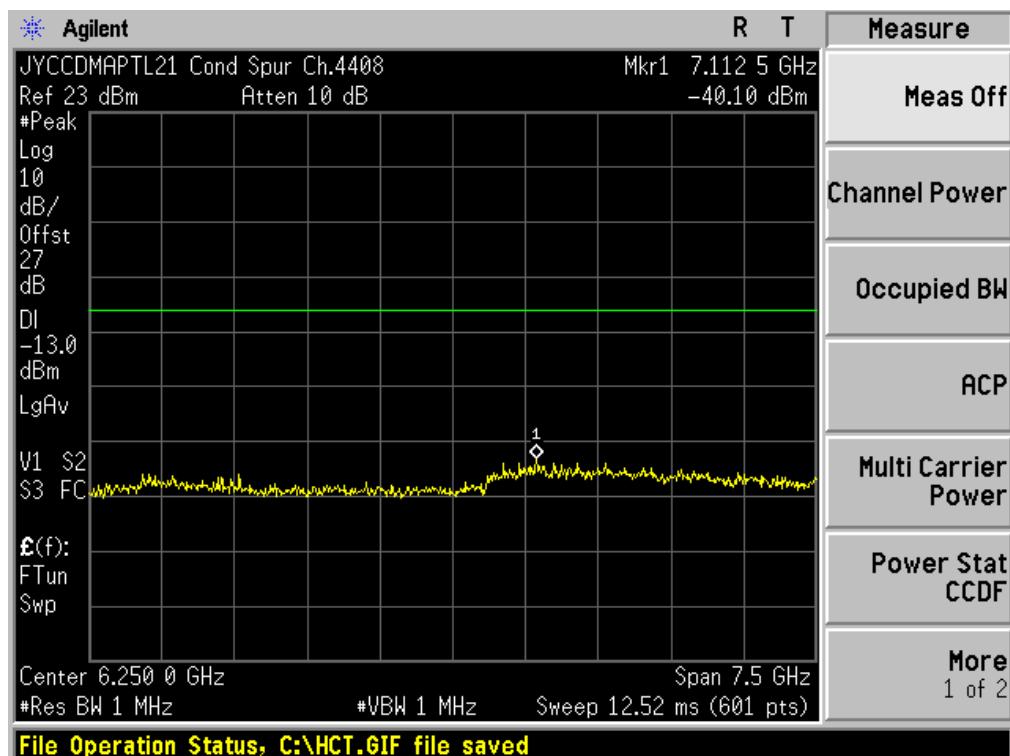


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ WCDMA850 MODE (4183 CH.) Conducted Spurious Emissions1



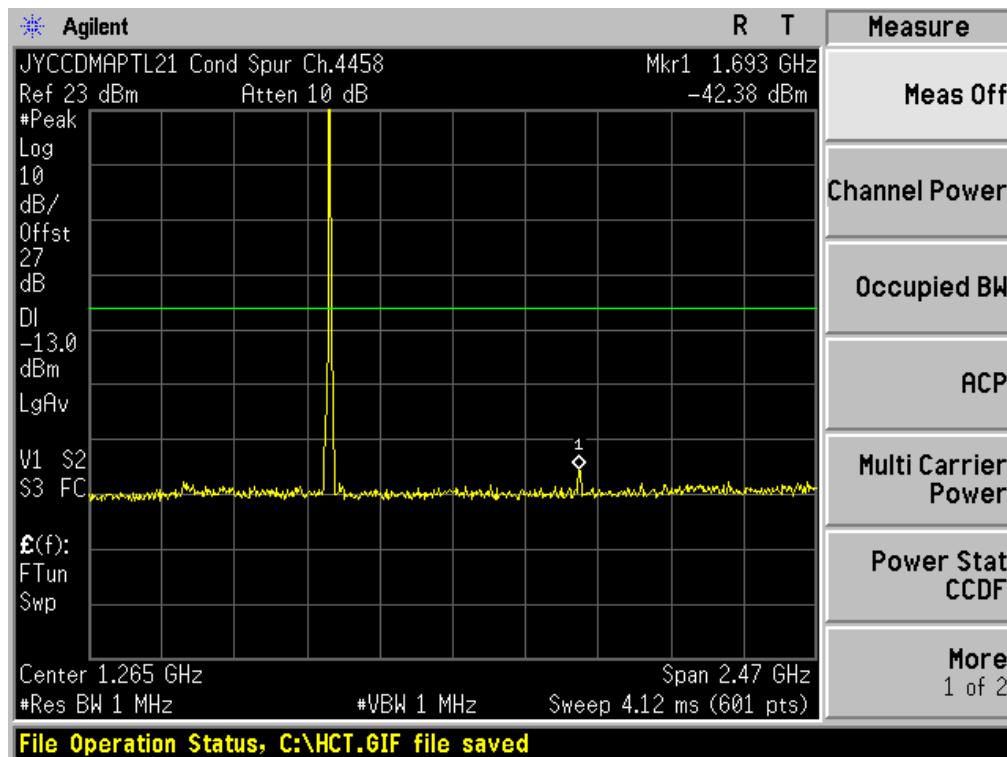
■ WCDMA850 MODE (4183 CH.) Conducted Spurious Emissions2



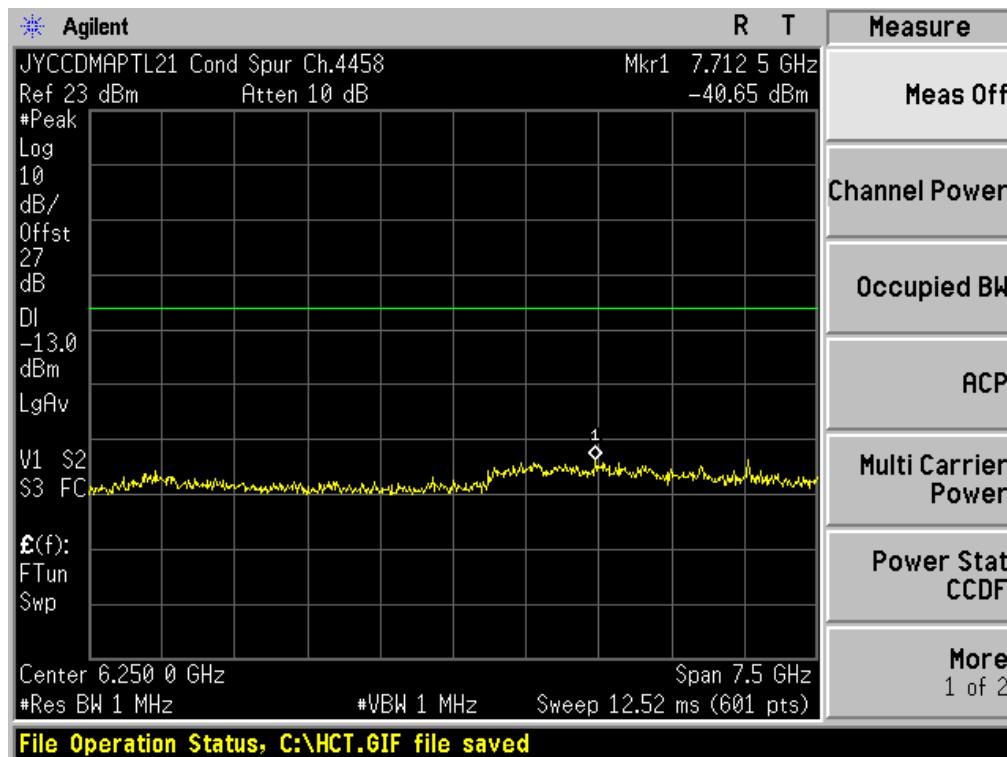
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ WCDMA850MODE (4233 CH.) Conducted Spurious Emissions1



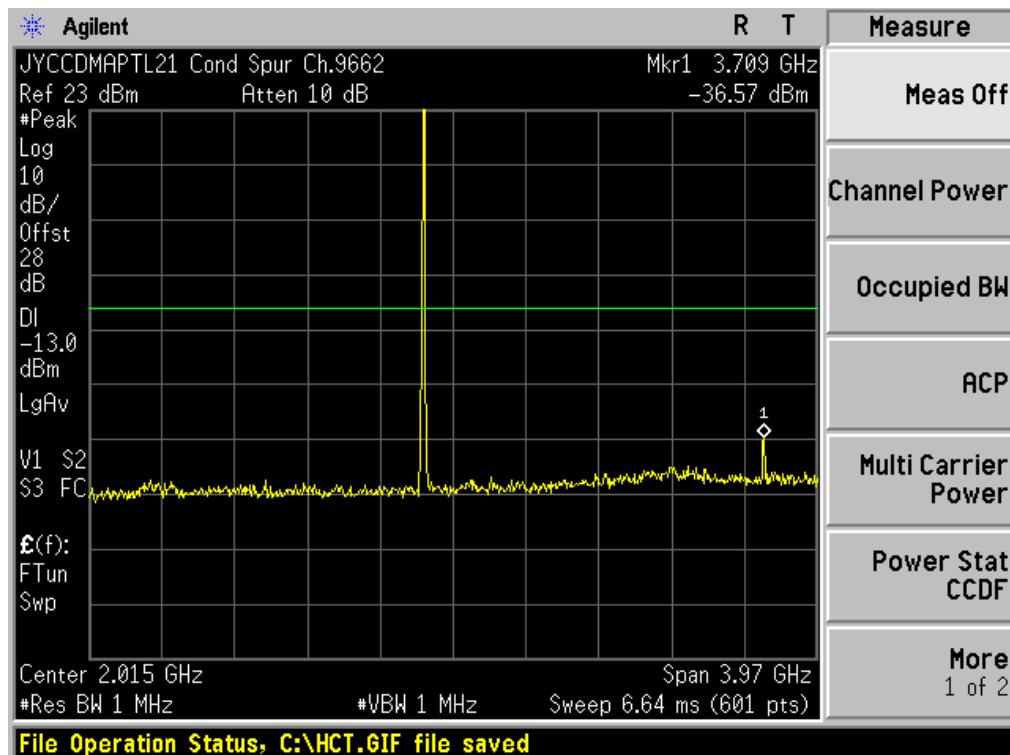
■ WCDMA850MODE (4233 CH.) Conducted Spurious Emissions2



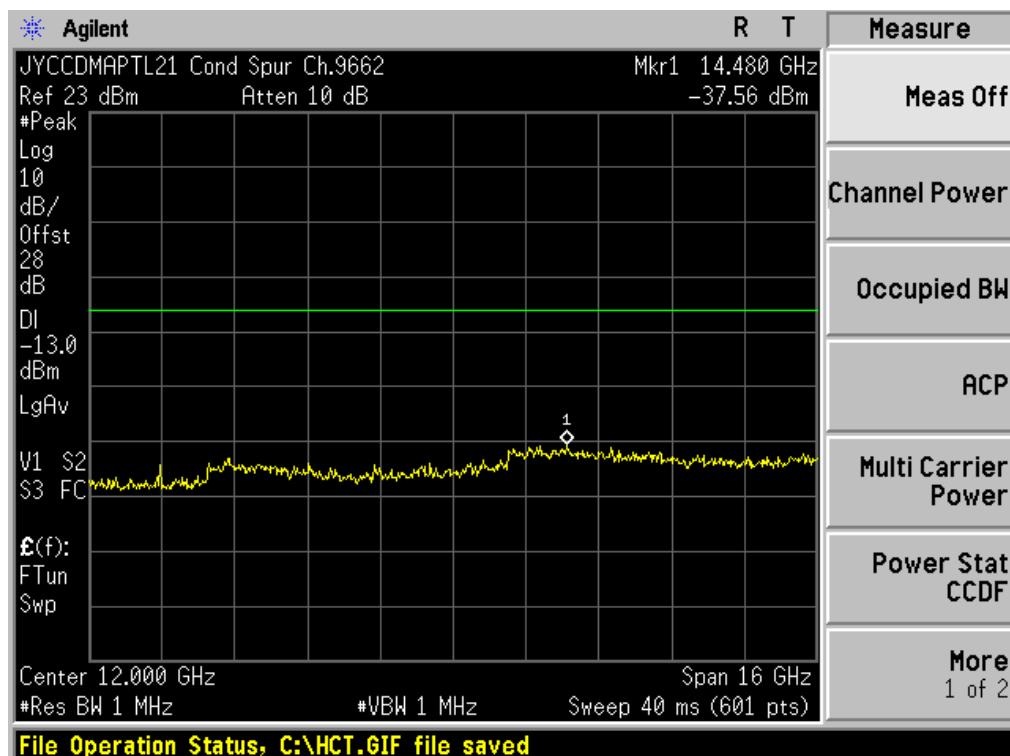
FCC CERTIFICATION REPORT

Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	www.hct.co.kr
			FCC ID: JYCCDMAPTL21

■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions1

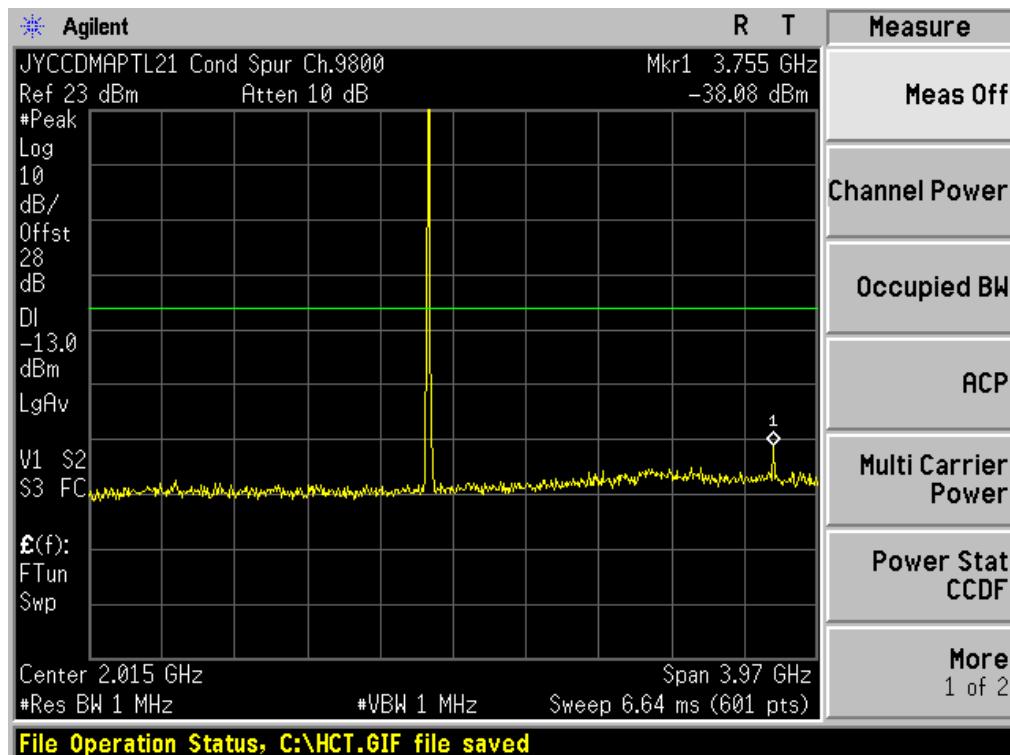


■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions2

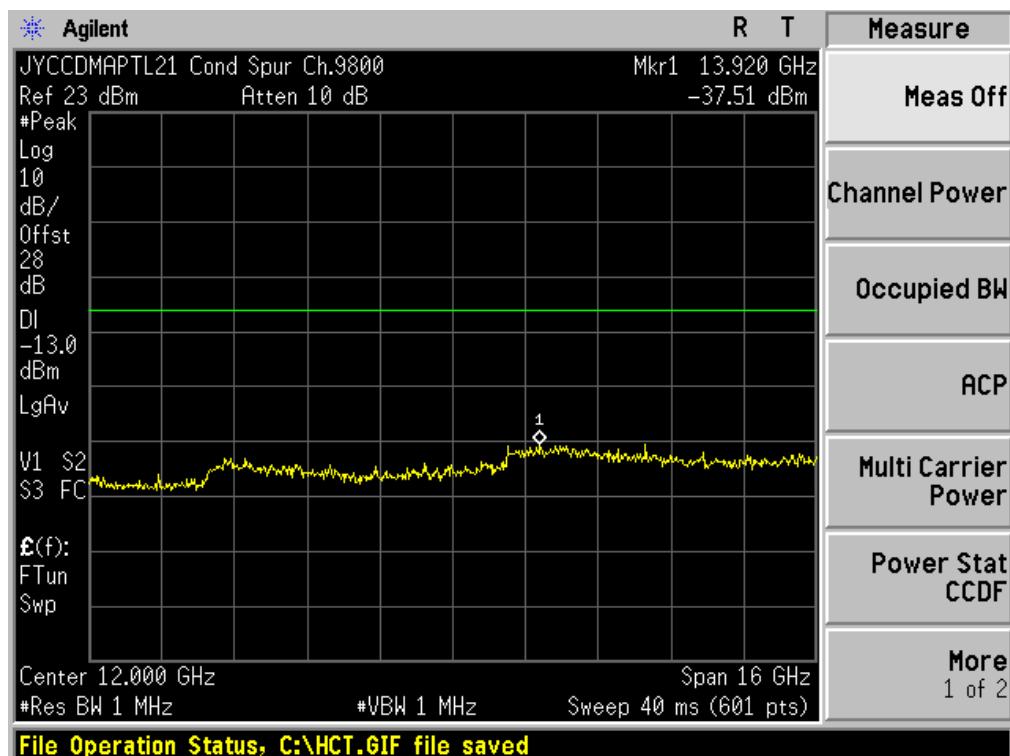


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions1

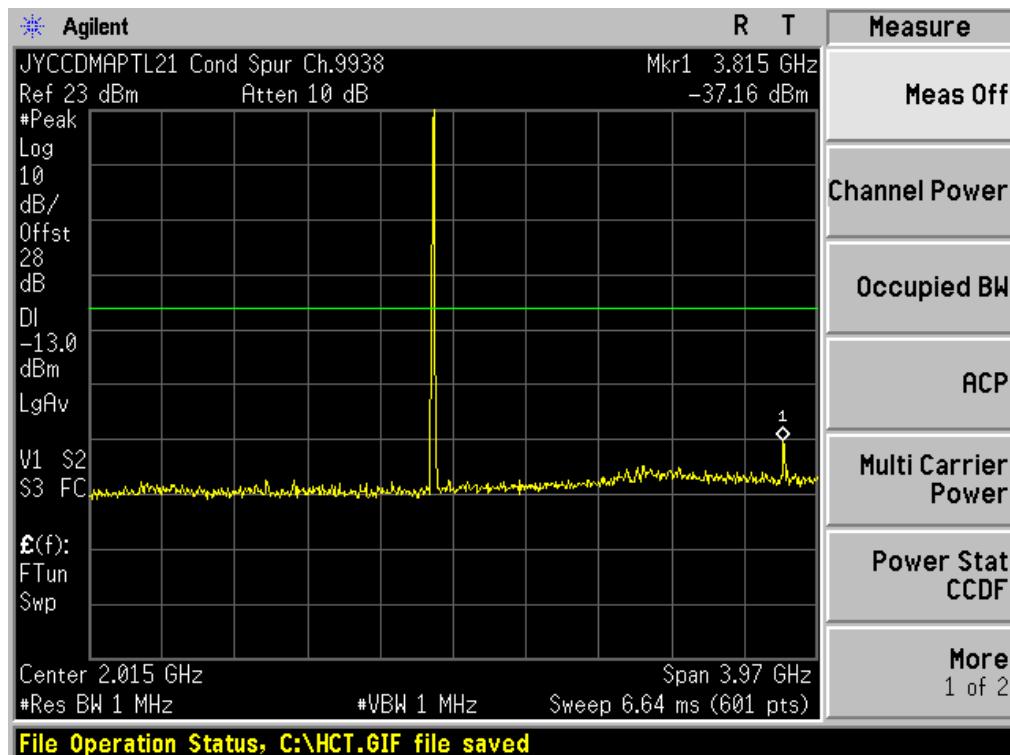


■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions2

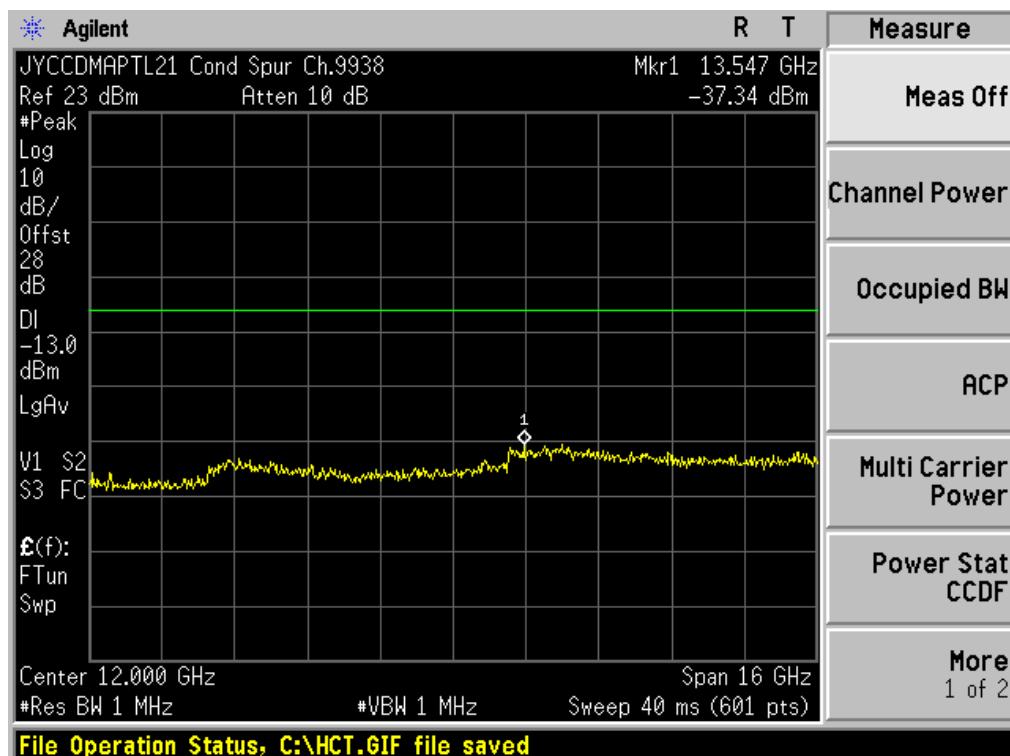


Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions1



■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions2



Test Report No. HCTR1208FR13	Date of Issue: August 14, 2012	EUT Type: GSM/WCDMA/CDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCCDMAPTL21
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