

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Certification

Applicant Name:

Pantech Co., Ltd.

Date of Issue:

September 02, 2011

Location:

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

Address:

Pantech Bldg, I-2, DMC, Sangam-dong, Mapo-gu, Seoul, 121-792, Korea

Test Report No.: HCTR1109FR05

HCT FRN: 0005866421

FCC ID: JYCP4100

APPLICANT: Pantech Co., Ltd.

FCC Model(s):

P4100

EUT Type:

GSM/WCDMA/LTE Phone with Bluetooth / WLAN

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:

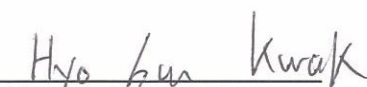
0.305 W ERP GSM850 (24.85 dBm) / 0.665 W EIRP GSM1900 (28.23 dBm)
0.137 W ERP EDGE850 (21.37 dBm) / 0.590 W EIRP EDGE1900 (27.71 dBm)
0.081 W ERP WCDMA850(19.06 dBm) / 0.308 W EIRP WCDMA1900(24.88 dBm)

Emission Designator(s):

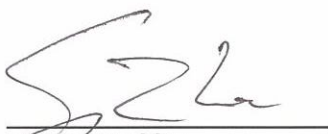
245KGXW (GSM850) 244KGXW (GSM1900)
245 KG7W (GSM850 EDGE) 247 KG7W (GSM1900 EDGE)
4M15F9W (WCDMA850) 4M16F9W (WCDMA1900)

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
: Hyo Sun Kwak

Test engineer of RF Team


Approved by
: Sang Jun Lee

Manager of RF Team

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Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1109FR05	September 02, 2011	First Approval Report

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	17
7.3 OCCUPIED BANDWIDTH	18
7.4 CONDUCTED SPURIOUS EMISSIONS	19
7.4.1 BAND EDGE.....	19
7.5 EFFECTIVE RADIATED POWER OUTPUT (GSM / WCDMA)	20
7.6 EQUIVALENT ISOTROPIC RADIATED POWER (GSM / WCDMA)	21
7.7 RADIATED SPURIOUS EMISSIONS	22
7.7.1 RADIATED SPURIOUS EMISSIONS (GSM850)	22
7.7.2 RADIATED SPURIOUS EMISSIONS (GSM1900)	23
7.7.3 RADIATED SPURIOUS EMISSIONS (WCDMA850)	24
7.7.4 RADIATED SPURIOUS EMISSIONS (WCDMA1900)	25
7.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE	26
7.8.1 FREQUENCY STABILITY (GSM850)	26
7.8.2 FREQUENCY STABILITY (GSM1900)	27
7.8.3 FREQUENCY STABILITY (WCDMA850)	28
7.8.4 FREQUENCY STABILITY (WCDMA1900)	29
8. TEST PLOTS.....	30

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: JYCP4100

Application Type: Certification

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FCC Rule Part(s): §22, §24, §2

EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN

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Tx Frequency: 824.20 - 848.80 MHz (GSM850)
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Rx Frequency: 869.20 - 893.80 MHz (GSM850)
871.40 - 891.60 MHz (WCDMA850)
1 930.20 - 1 989.80 MHz (GSM1900)
1 932.4 - 1 987.6 MHz (WCDMA1900)

Max. RF Output Power: 0.305 W ERP GSM850 (24.85 dBm) / 0.665 W EIRP GSM1900 (28.23 dBm)
0.137 W ERP EDGE850 (21.37 dBm) / 0.590 W EIRP EDGE1900 (27.71 dBm)
0.081 W ERP WCDMA850(19.06 dBm) / 0.308 W EIRP WCDMA1900(24.88 dBm)

Emission Designator(s): 245KGXW (GSM850) 244KGXW (GSM1900)
245 KG7W (GSM850 EDGE) 247 KG7W (GSM1900 EDGE)
4M15F9W (WCDMA850) 4M16F9W (WCDMA1900)

Date(s) of Tests: August 17, 2011 ~ August 31, 2011

Antenna Specification Manufacturer: DONGNAM Co.,Ltd
Antenna type: INTENNA Antenna
Peak Gain: 3.00 dBi

2. INTRODUCTION

2.1. EUT DESCRIPTION

The Pantech Co., Ltd. P4100 GSM/WCDMA/LTE Phone with Bluetooth / WLAN consists of GSM850, GSM1900, GPRS Class10, GPRS mode Class B(GPRS and GSM, but not simultaneously), EDGE, WCDMA850, WCDMA1900, HSDPA and HSUPA.

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 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, 467-811, KOREA.

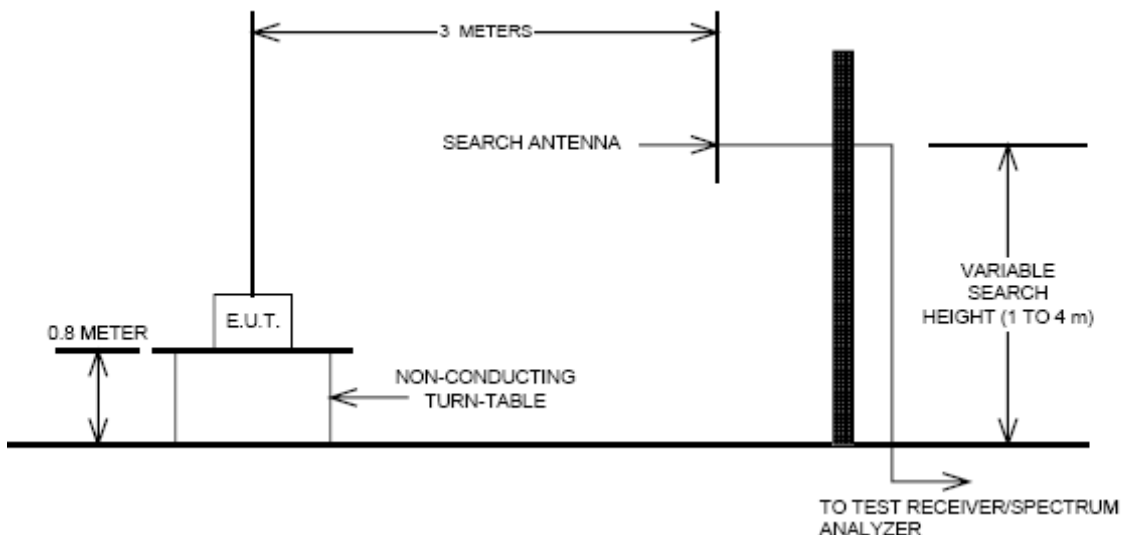
The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 02, 2011 (Registration Number: 90661)

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100

3. DESCRIPTION OF TESTS

3.1 EFFECTIVE RADIATED POWER/EQUIVALENT ISOTROPIC RADIATED POWER

Test Set-up



Test Procedure

Radiated emission measurements were performed at an SAC(Semi-Anechoic Chamber)

The equipment under test is placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. A styrofoam 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. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN		FCC ID: JYCP4100

3.2 PEAK- TO- AVERAGE RATIO

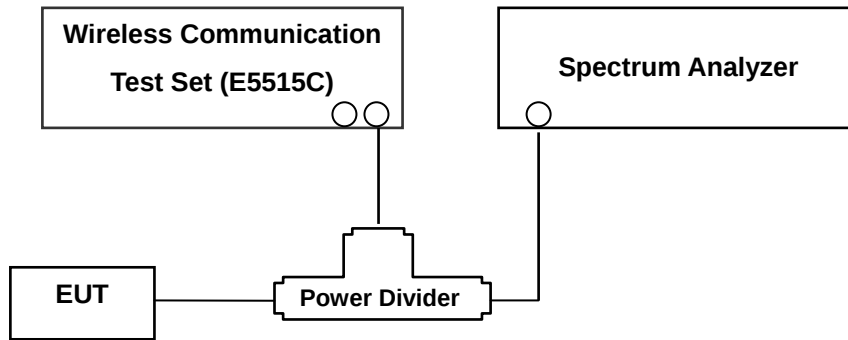
A peak to average ratio measurement is performed at the conducted port of the EUT. For CDMA and WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT 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. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100

3.3 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)
Test Procedure

The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Plots of the EUT's occupied bandwidth are shown herein.

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.

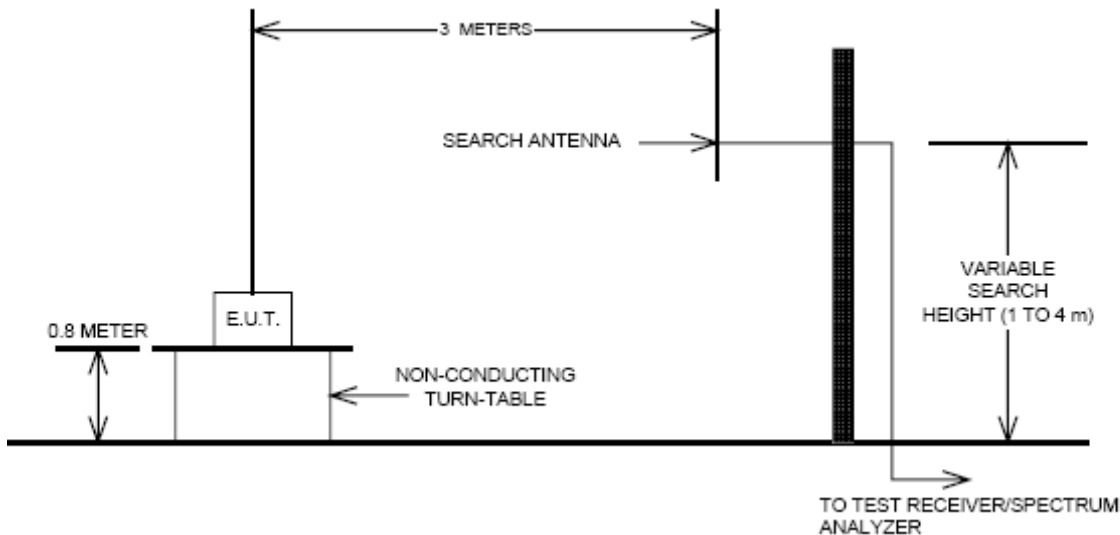
The EUT was setup to maximum output power at its lowest channel. The Resolution BW of the analyzer is set to 1 % of the emission bandwidth to show compliance with the – 13 dBm limit, in the 1 MHz bands immediately outside and adjacent to the edge of the frequency block. The 1 MHz RBW was used to scan 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 : In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

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Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100

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 SAC(Semi-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 styrofoam platform mounted at three from the antenna mast.

- 1) The unit mounted on a styrofoam 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

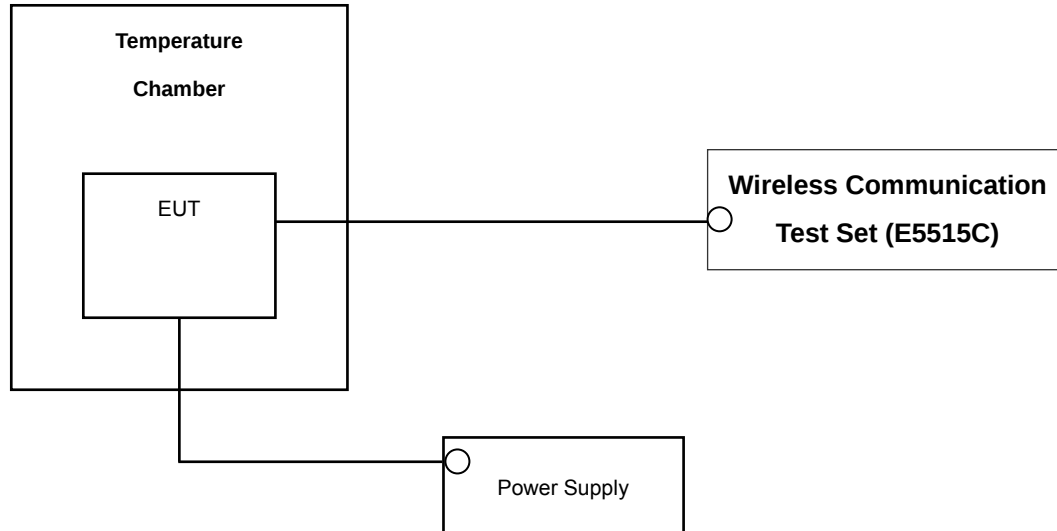
The equipment under test is placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. A styrofoam turntable was rotated 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A half wave dipole was substituted in place of the EUT. This dipole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

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3.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



* Nominal Operating Voltage

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 $\pm 0.000\ 25\ \%$ ($\pm 2.5\ \text{ppm}$) 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.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
R&S	N9020A	MY51110020	Annual	04/16/2012
Agilent	E4416A/ Power Meter	GB41291412	Annual	01/04/2012
Agilent	E9327A/ Power Sensor	MY4442009	Annual	05/02/2012
Agilent	8960 (E5515C)/ Base Station	GB44400269	Annual	02/10/2012
MITEQ	AMF-6D-001180-35-20P/AMP	990893	Annual	05/02/2012
Wainwright	WHK1.2/15G-10EF/H.P.F	2	Annual	05/02/2012
Wainwright	WHK3.3/18G-10EF/H.P.F	1	Annual	05/02/2012
Agilent	775D/ Dual Directional Coupler	12922	Annual	12/29/2011
Agilent	11636B/ Power Divider	11377	Annual	12/29/2011
Digital	EP-3010/ Power Supply	3110117	Annual	01/04/2012
Schwarzbeck	UHAP/ Dipole Antenna	949	Biennial	03/18/2012
Schwarzbeck	UHAP/ Dipole Antenna	950	Biennial	03/18/2012
Korea Engineering	KR-1005L / Chamber	KRAB07063-2CH	Annual	12/28/2011
Schwarzbeck	BBHA 9120D/ Horn Antenna	296	Biennial	09/23/2011
Schwarzbeck	BBHA 9120D/ Horn Antenna	147	Biennial	04/13/2012
Agilent	E4440A/Spectrum Analyzer	US45303008	Annual	05/02/2012

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	CONDUCTED	PASS
2.1051, 22.917(a), 24.238(a)	Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	$< 43 + 10\log_{10} (P[\text{Watts}])$ at Band Edge and for all out-of-band emissions		PASS
2.1046	Conducted Output Power	-		PASS
24.232(d)	Peak- to- Average Ratio	$< 13 \text{ dB}$		PASS
2.1055, 22.355, 24.235	Frequency stability / variation of ambient temperature	$< 2.5 \text{ ppm}$		PASS
22.913(a)(2) 24.232(c)	Effective Radiated Power	$< 7 \text{ Watts max. ERP}$	RADIATED	PASS
	Equivalent Isotropic Radiated Power	$< 2 \text{ Watts max. EIRP}$		PASS
2.1053, 22.917(a), 24.238(a)	Radiated Spurious and Harmonic Emissions	$< 43 + 10\log_{10} (P[\text{Watts}])$ for all out-of band emissions		PASS

6. SAMPLE CALCULATION

A. ERP Sample Calculation

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

$$\text{ERP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 1) The EUT mounted on a wooden tripod 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

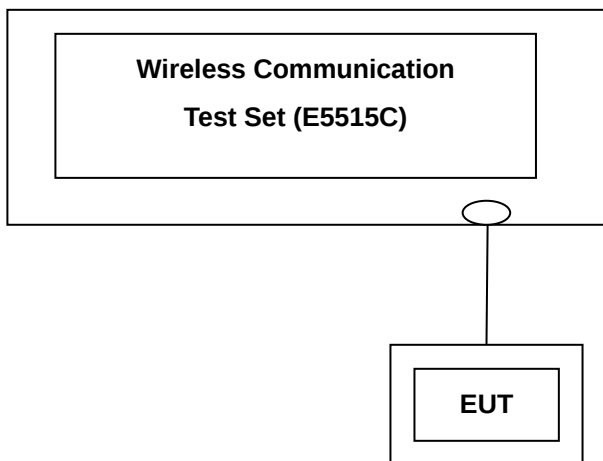
9 = Composite Digital Info

W = Combination (Audio/Data)

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	GPRS Data	
		GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)
GSM 850	128	33.20	31.60
	190	33.10	31.60
	251	33.20	31.70
GSM 1900	512	29.60	28.40
	661	29.40	28.40
	810	29.40	28.70

(GSM Conducted Maximum Output Powers)

Band	Channel	EDGE Data	
		EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)
GSM 850	128	26.80	26.20
	190	26.70	26.00
	251	26.90	26.10
GSM 1900	512	25.80	25.00
	661	25.70	25.80
	810	25.70	25.90

(GSM EDGE Conducted Output Powers)

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	23.30	23.20	23.30	-
99	WCDMA	12.2 kbps AMR	-	-	-	-
5	HSDPA	Subtest 1	23.20	23.10	23.10	0
5		Subtest 2	23.10	23.10	23.20	0
5		Subtest 3	22.70	22.50	22.70	-0.5
5		Subtest 4	22.70	22.60	22.60	-0.5
6	HSUPA	Subtest 1	22.40	22.30	22.30	0
6		Subtest 2	20.80	20.90	21.00	-2
6		Subtest 3	21.80	22.20	21.90	-1
6		Subtest 4	21.50	21.40	21.50	-2
6		Subtest 5	22.20	22.60	22.20	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	23.20	23.10	23.00	-
99	WCDMA	12.2 kbps AMR	-	-	-	-
5	HSDPA	Subtest 1	23.20	23.10	23.00	0
5		Subtest 2	23.10	23.10	23.20	0
5		Subtest 3	22.60	22.30	22.40	-0.5
5		Subtest 4	22.60	22.40	22.30	-0.5
6	HSUPA	Subtest 1	22.60	22.20	22.30	0
6		Subtest 2	20.90	21.00	20.90	-2
6		Subtest 3	21.90	21.80	21.90	-1
6		Subtest 4	21.30	21.10	20.70	-2
6		Subtest 5	22.80	22.80	22.50	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 35, 39.

7.3 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (GSM: kHz / WCDMA : MHz)
GSM850	128	824.20	245.2946
	190	836.60	242.9527
	251	848.80	244.9942
GSM850 EDGE	128	824.20	244.5812
GSM1900	512	1850.20	243.9578
	661	1880.00	242.0290
	810	1909.80	244.2333
GSM1900 EDGE	810	1909.80	247.2515
WCDMA850	4132	826.40	4.1240
	4183	836.60	4.1535
	4233	846.60	4.1311
WCDMA1900	9262	1852.40	4.1551
	9400	1880.00	4.1243
	9538	1907.60	4.1342

- Plots of the EUT's Occupied Bandwidth are shown Page 31 ~ 34, 36 ~ 38.

7.4 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Maximum Data (dBm)
GSM850	128	6.9625	-30.14
	190	7.3250	-30.11
	251	8.0125	-30.06
GSM1900	512	14.4530	-26.58
	661	13.3070	-27.39
	810	14.4530	-27.51
WCDMA850	4132	7.0375	-40.18
	4183	7.3375	-40.15
	4233	7.3375	-40.74
WCDMA1900	9262	14.2670	-37.42
	9400	14.4000	-37.47
	9538	14.2130	-37.31

- Plots of the EUT's Conducted Spurious Emissions are shown Page 51 ~ 63.

7.4.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 39 ~ 51.

7.5 EFFECTIVE RADIATED POWER OUTPUT (GSM / WCDMA)

(GSM850 Mode)

Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	ERP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)			W	dBm
128	824.20	-12.01	36.92	-10.54	1.61	V	0.30	24.77
190	836.60	-12.48	36.44	-10.50	1.67	V	0.27	24.27
251	848.80	-12.10	36.96	-10.47	1.64	V	0.31	24.85
EDGE 128	824.20	-15.41	33.52	-10.54	1.61	V	0.14	21.37

(WCDMA850 Mode)

Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	ERP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)			W	dBm
4132	826.40	-18.75	30.18	-10.54	1.61	V	0.064	18.03
4183	836.60	-18.56	30.36	-10.50	1.67	V	0.066	18.19
4233	846.60	-17.89	31.17	-10.47	1.64	V	0.081	19.06

Note: Standard batteries are the only options for this phone

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 z plane in GSM850 and WCDMA850 mode. Also worst case of detecting Antenna is vertical polarization in GSM850 and WCDMA850 mode.

The EDGE mode testing were performed using 1Tx because 1Tx is highest power in EDGE mode.

7.6 EQUIVALENT ISOTROPIC RADIATED POWER (GSM / WCDMA)

(GSM1900 Mode)

Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)			W	dBm
512	1,850.20	-13.04	20.67	10.40	2.83	H	0.67	28.23
661	1,880.00	-13.48	20.30	10.43	2.81	H	0.62	27.92
810	1,909.80	-14.00	19.99	10.47	2.86	H	0.58	27.60
EDGE 512	1,850.20	-13.56	20.15	10.40	2.83	H	0.59	27.71

(WCDMA1900 Mode)

Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)			W	dBm
9262	1,852.40	-16.39	17.32	10.40	2.83	H	0.31	24.88
9400	1,880.00	-16.93	16.85	10.43	2.81	H	0.28	24.47
9538	1,907.60	-17.46	16.53	10.47	2.86	H	0.26	24.14

Note: Standard batteries are the only options for this phone

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 y plane in GSM1900 and WCDMA1900 mode. Also worst case of detecting Antenna is in horizontal polarization in GSM1900 and WCDMA1900 mode.

The EDGE mode testing were performed using 1Tx because 1Tx is highest power in EDGE mode.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN		FCC ID: JYCP4100

7.7 RADIATED SPURIOUS EMISSIONS

7.7.1 RADIATED SPURIOUS EMISSIONS (GSM850)

- ☐ MEASURED OUTPUT POWER: 24.85 dBm = 0.305W
☐ MODULATION SIGNAL: GSM850
☐ DISTANCE: 3 meters
☐ LIMIT: $-(43 + 10 \log_{10}(W)) =$ - 37.85 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
128 (824.2)	1,648.40	-27.83	9.66	-38.16	2.63	H	-31.13	-55.98
	2,472.60	-38.61	10.79	-46.45	3.55	H	-39.21	-64.06
	3,296.80	-46.22	11.76	-54.59	4.79	H	-47.62	-72.47
190 (836.6)	1,673.20	-31.48	9.77	-41.88	2.67	H	-34.78	-59.63
	2,509.80	-39.26	10.82	-47.17	3.61	H	-39.96	-64.81
	3,346.40	-	-	-	-	-	-	-
251 (848.8)	1,697.60	-31.98	9.94	-42.81	2.61	H	-35.48	-60.33
	2,546.40	-37.63	10.84	-45.97	3.60	H	-38.73	-63.58
	3,395.20	-49.61	11.98	-58.38	4.11	V	-50.51	-75.36

- 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.

7.7.2 RADIATED SPURIOUS EMISSIONS (GSM1900)

☐ MEASURED OUTPUT POWER: 28.23 dBm = 0.665 W
☐ MODULATION SIGNAL: GSM1900
☐ DISTANCE: 3 meters
☐ LIMIT: $-(43 + 10 \log_{10}(W)) =$ - 41.23 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
512 (1850.2)	3,700.40	-47.14	12.36	-53.93	4.87	V	-46.44	-74.67
	5,550.60	-	-	-	-	-	-	-
	7,400.80	-	-	-	-	-	-	-
661 (1880.0)	3,760.00	-47.04	12.40	-53.76	4.88	V	-46.24	-74.47
	5,640.00	-53.42	12.65	-54.73	6.54	H	-48.62	-76.85
	7,520.00	-	-	-	-	-	-	-
810 (1909.8)	3,819.60	-46.83	12.45	-53.06	5.02	V	-45.63	-73.86
	5,729.40	-52.26	12.71	-53.63	6.54	H	-47.46	-75.69
	7,639.20	-	-	-	-	-	-	-

- 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.

7.7.3 RADIATED SPURIOUS EMISSIONS (WCDMA850)

■ MEASURED OUTPUT POWER: 19.06 dBm = 0.081 W
 ■ MODULATION SIGNAL: WCDMA850
 ■ DISTANCE: 3 meters
 ■ LIMIT: - (43 + 10 log₁₀ (W)) = - 32.06 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
4,132 (826.4)	1,652.80	-48.12	8.57	-57.95	2.04	H	-51.42	-70.48
	2,479.20	-49.95	11.10	-58.70	2.95	H	-50.55	-69.61
	3,305.60	-	-	-	-	-	-	-
4,183 (836.6)	1,673.20	-50.98	8.57	-60.73	2.12	H	-54.28	-73.34
	2,509.80	-50.44	11.15	-59.36	2.93	H	-51.14	-70.20
	3,346.40	-	-	-	-	-	-	-
4,233 (846.6)	1,693.20	-48.12	8.57	-58.11	2.08	H	-51.62	-70.68
	2,539.80	-50.50	11.15	-59.78	2.97	H	-51.60	-70.66
	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.

7.7.4 RADIATED SPURIOUS EMISSIONS (WCDMA1900)

- ☐ MEASURED OUTPUT POWER: 24.88 dBm = 0.308 W
☐ MODULATION SIGNAL: WCDMA1900
☐ DISTANCE: 3 meters
☐ LIMIT: $-(43 + 10 \log_{10}(W)) =$ - 37.88 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
9262	3,704.80	-51.04	12.46	-59.02	3.78	V	-50.34	-75.22
	5,557.20	-	-	-	-	-	-	-
	7,409.60	-	-	-	-	-	-	-
9400	3,760.00	-50.64	12.47	-58.47	3.84	V	-49.84	-74.72
	5,640.00	-	-	-	-	-	-	-
	7,520.00	-	-	-	-	-	-	-
9538	3,815.20	-49.81	12.46	-57.21	3.86	V	-48.61	-73.49
	5,722.80	-	-	-	-	-	-	-
	7,630.40	-	-	-	-	-	-	-

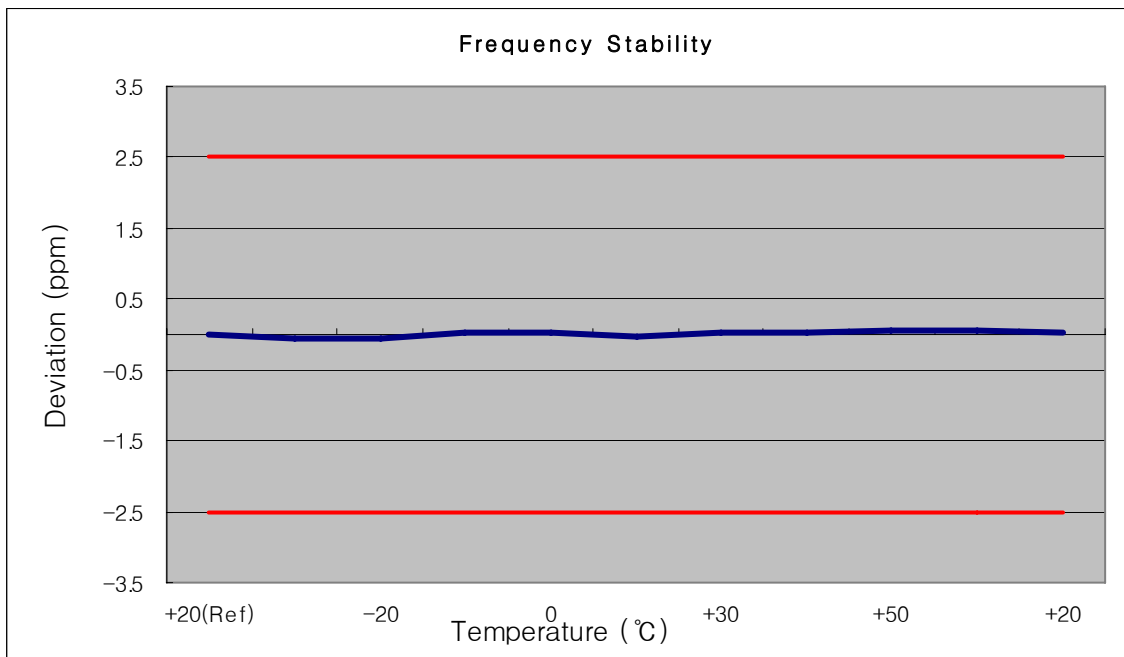
- NOTES:**
1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:
 2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.
 3. we have done x, y, z planes in EUT and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

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

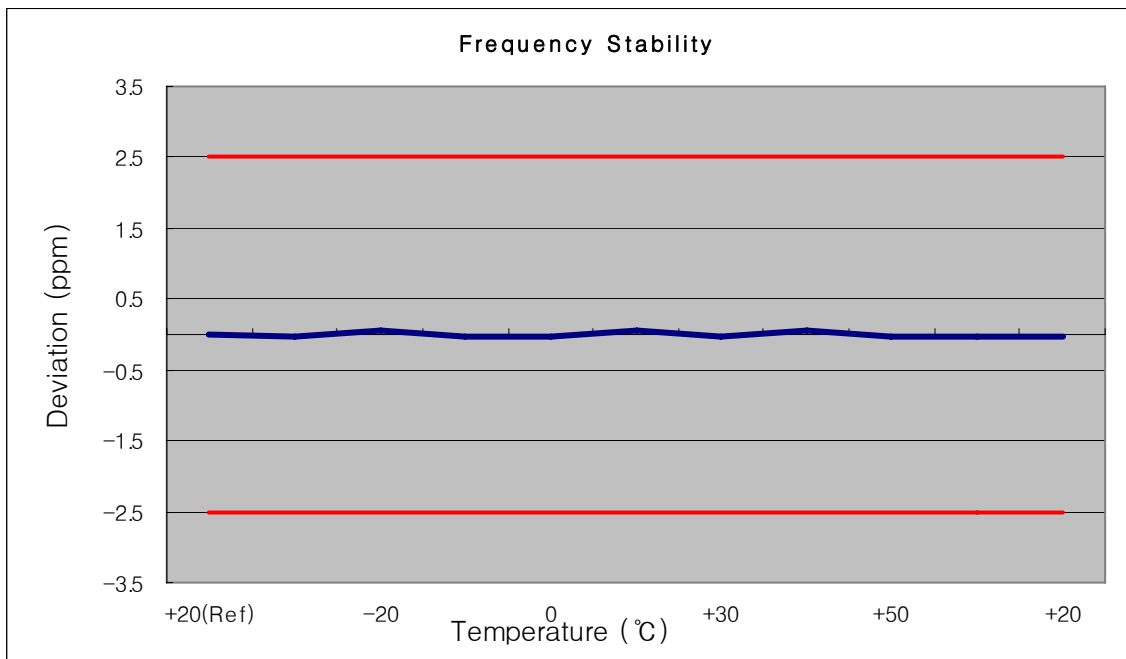
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	836 599 970	0	0.000 000	0.000
100%		-30	836 599 931	-39.25	-0.000 005	-0.047
100%		-20	836 599 933	-37.20	-0.000 004	-0.044
100%		-10	836 600 005	34.58	0.000 004	0.041
100%		0	836 600 004	34.06	0.000 004	0.041
100%		+10	836 599 935	-34.91	-0.000 004	-0.042
100%		+30	836 599 999	28.55	0.000 003	0.034
100%		+40	836 600 000	29.43	0.000 004	0.035
100%		+50	836 600 006	35.86	0.000 004	0.043
115%	4.255	+20	836 600 006	35.71	0.000 004	0.043
Batt. Endpoint	3.400	+20	836 600 001	30.29	0.000 004	0.036



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

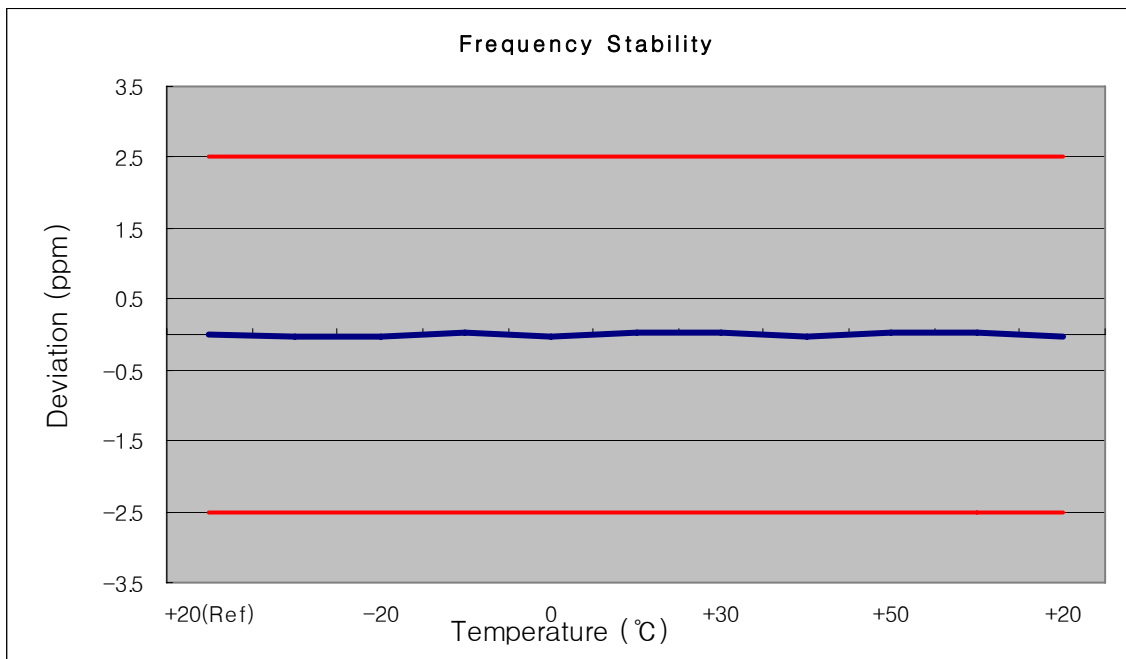
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	1879 999 901	0	0.000 000	0.000
100%		-30	1879 999 847	-54.07	-0.000 003	-0.029
100%		-20	1880 000 002	101.16	0.000 005	0.054
100%		-10	1879 999 855	-46.19	-0.000 002	-0.025
100%		0	1879 999 844	-56.42	-0.000 003	-0.030
100%		+10	1880 000 003	101.80	0.000 005	0.054
100%		+30	1879 999 845	-55.40	-0.000 003	-0.029
100%		+40	1880 000 000	98.69	0.000 005	0.052
100%		+50	1879 999 844	-56.50	-0.000 003	-0.030
115%	4.255	+20	1879 999 850	-51.23	-0.000 003	-0.027
Batt. Endpoint	3.400	+20	1879 999 858	-42.92	-0.000 002	-0.023



7.8.3 FREQUENCY STABILITY (WCDMA850)

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

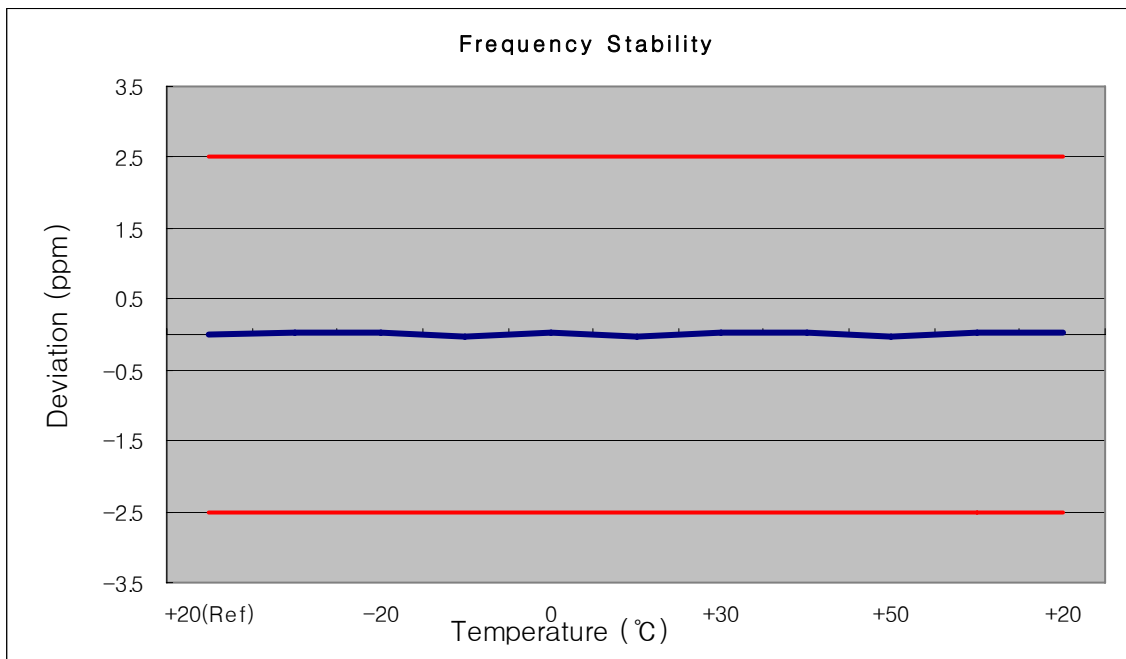
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	836 599 981	0	0.000 000	0.000
100%		-30	836 599 971	-28.59	-0.000 003	-0.034
100%		-20	836 599 978	-22.05	-0.000 003	-0.026
100%		-10	836 600 025	24.76	0.000 003	0.030
100%		0	836 599 980	-19.76	-0.000 002	-0.024
100%		+10	836 600 027	27.15	0.000 003	0.032
100%		+30	836 600 020	20.17	0.000 002	0.024
100%		+40	836 599 977	-22.83	-0.000 003	-0.027
100%		+50	836 600 017	17.43	0.000 002	0.021
115%	4.255	+20	836 600 026	25.59	0.000 003	0.031
Batt. Endpoint	3.400	+20	836 599 984	-16.39	-0.000 002	-0.020



7.8.4 FREQUENCY STABILITY (WCDMA1900)

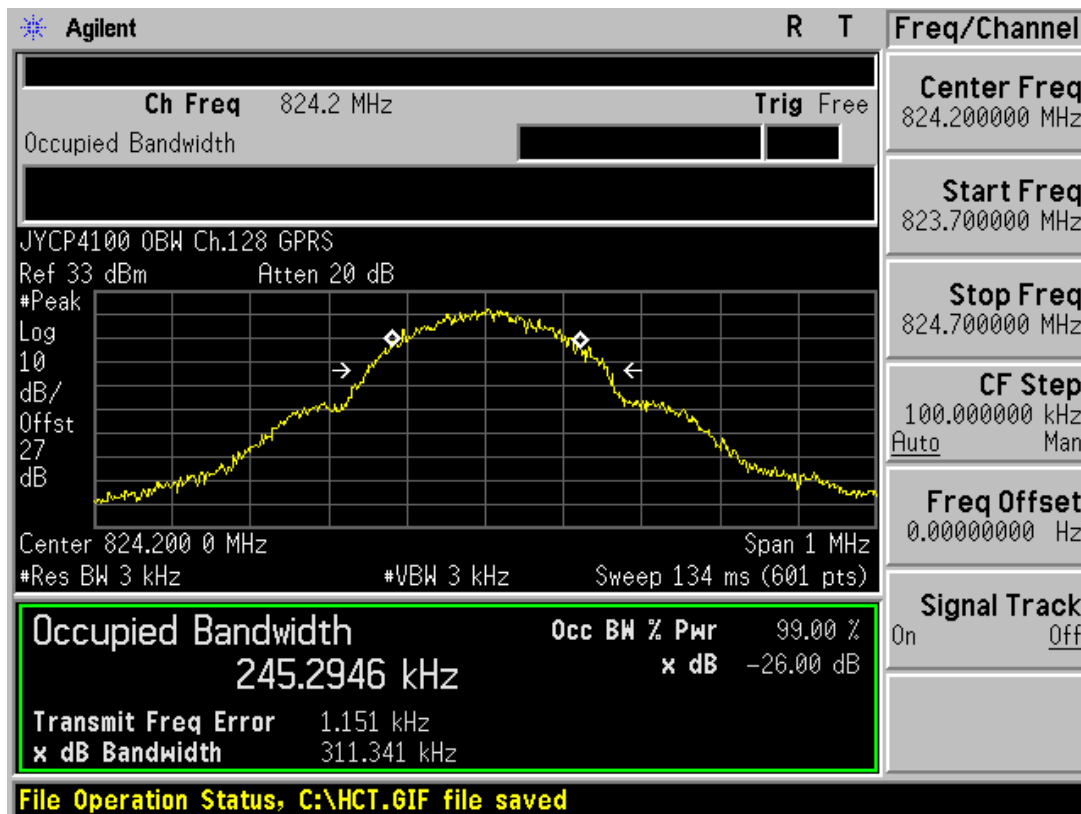
OPERATING FREQUENCY: 1,880,000,000 Hz
 CHANNEL: 9400
 REFERENCE VOLTAGE: 3.7 VDC
 DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	1879 999 935	0	0.000 000	0.000
100%		-30	1880 000 044	44.21	0.000 002	0.024
100%		-20	1880 000 064	63.59	0.000 003	0.034
100%		-10	1879 999 934	-66.18	-0.000 004	-0.035
100%		0	1880 000 052	52.26	0.000 003	0.028
100%		+10	1879 999 961	-38.82	-0.000 002	-0.021
100%		+30	1880 000 041	41.29	0.000 002	0.022
100%		+40	1880 000 067	67.33	0.000 004	0.036
100%		+50	1879 999 958	-41.69	-0.000 002	-0.022
115%	4.255	+20	1880 000 047	47.01	0.000 003	0.025
Batt. Endpoint	3.400	+20	1880 000 031	31.04	0.000 002	0.017

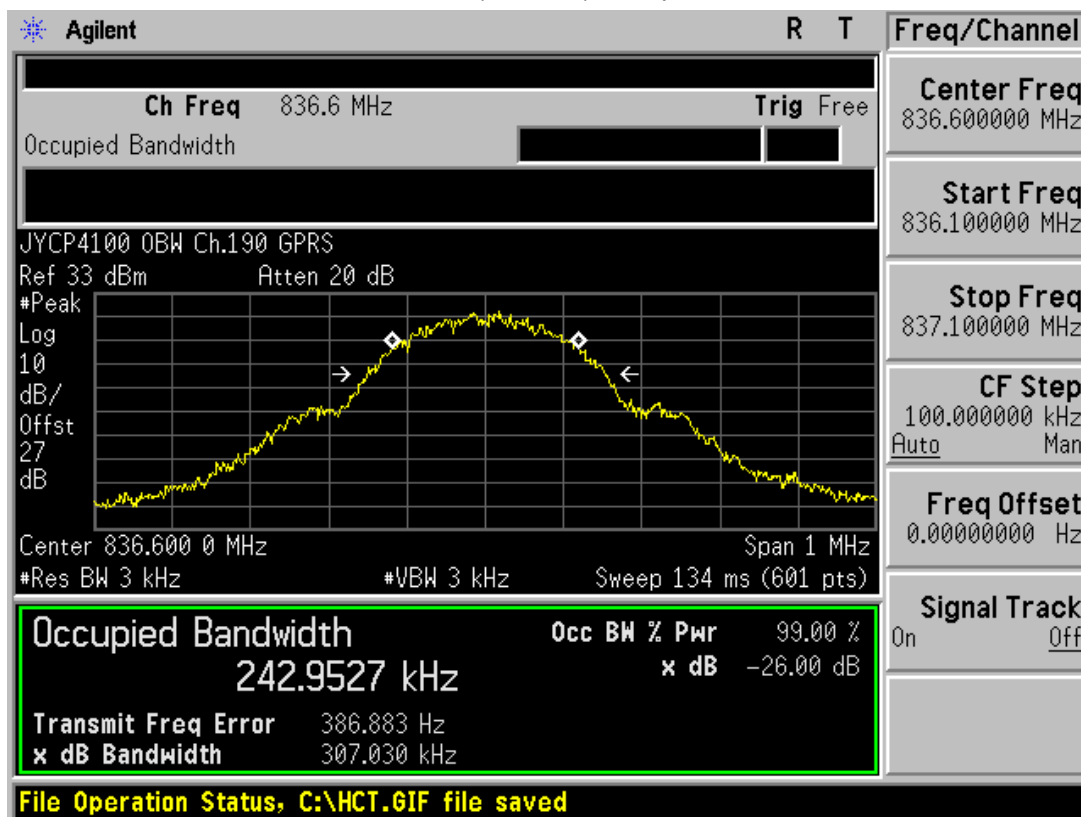


8. TEST PLOTS

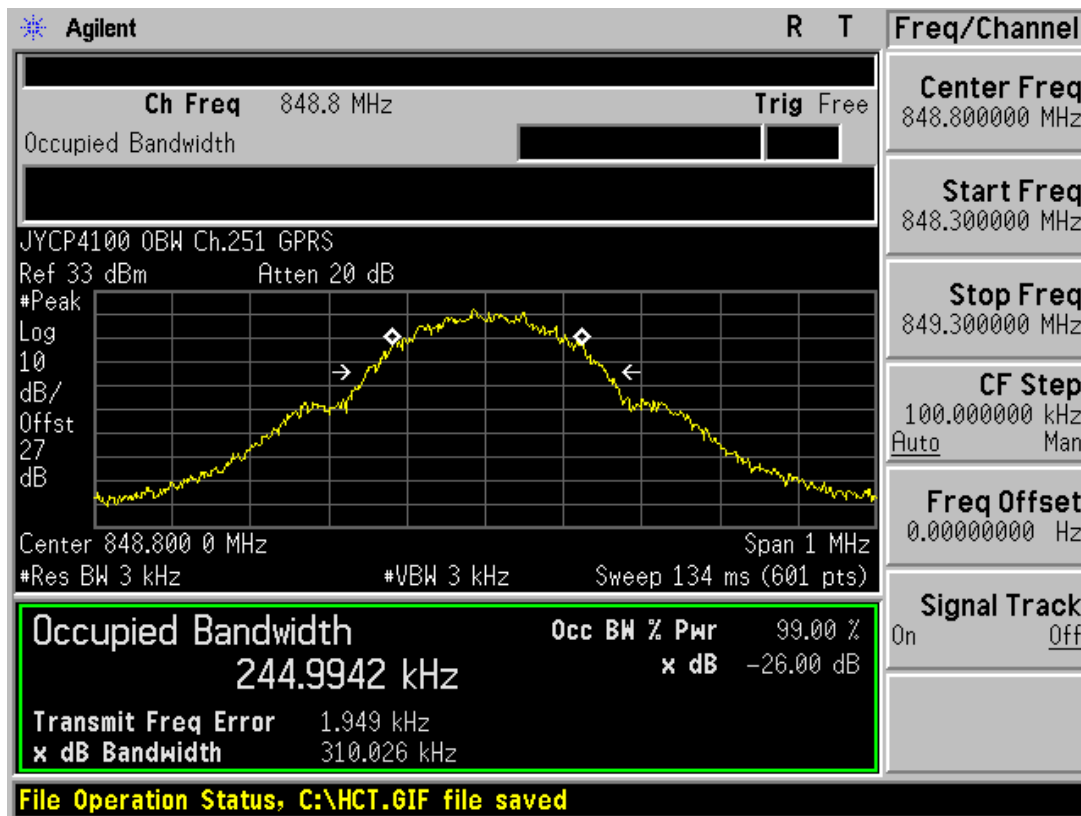
■ GSM850 MODE (128 CH.) Occupied Bandwidth



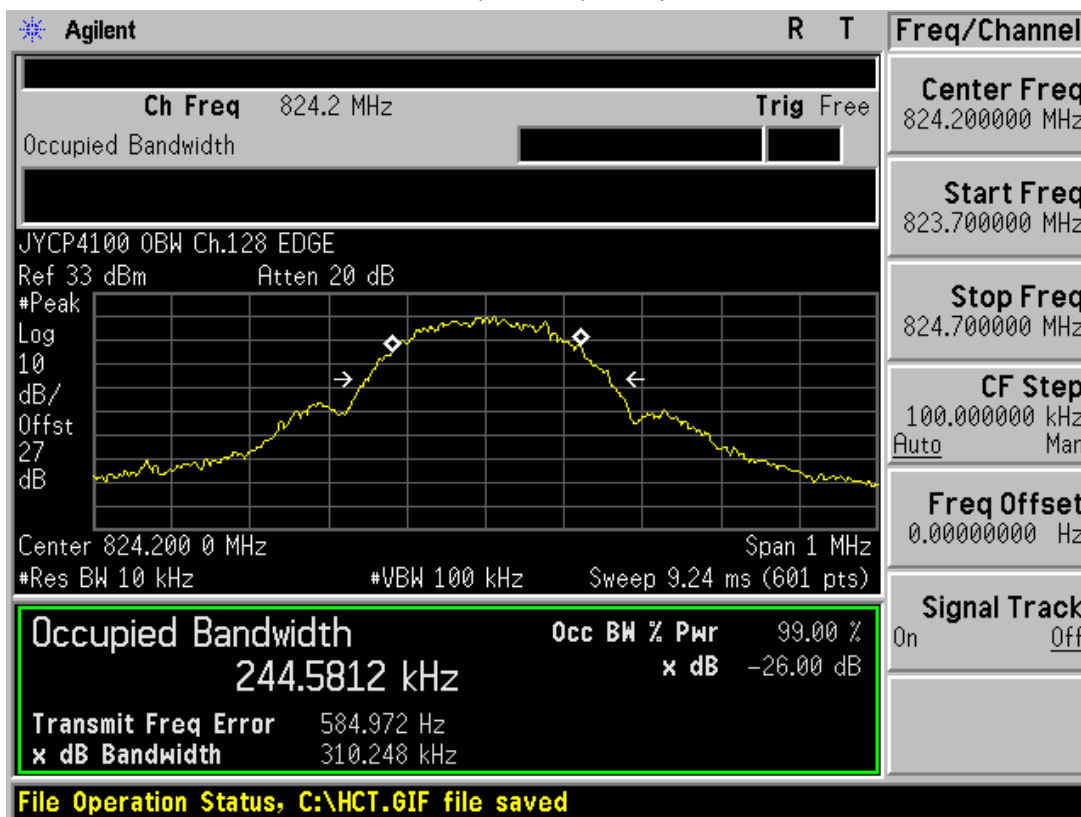
■ GSM850 MODE (190 CH.) Occupied Bandwidth



■ GSM850 MODE (251 CH.) Occupied Bandwidth



■ GSM850 EDGE (128 CH.) Occupied Bandwidth

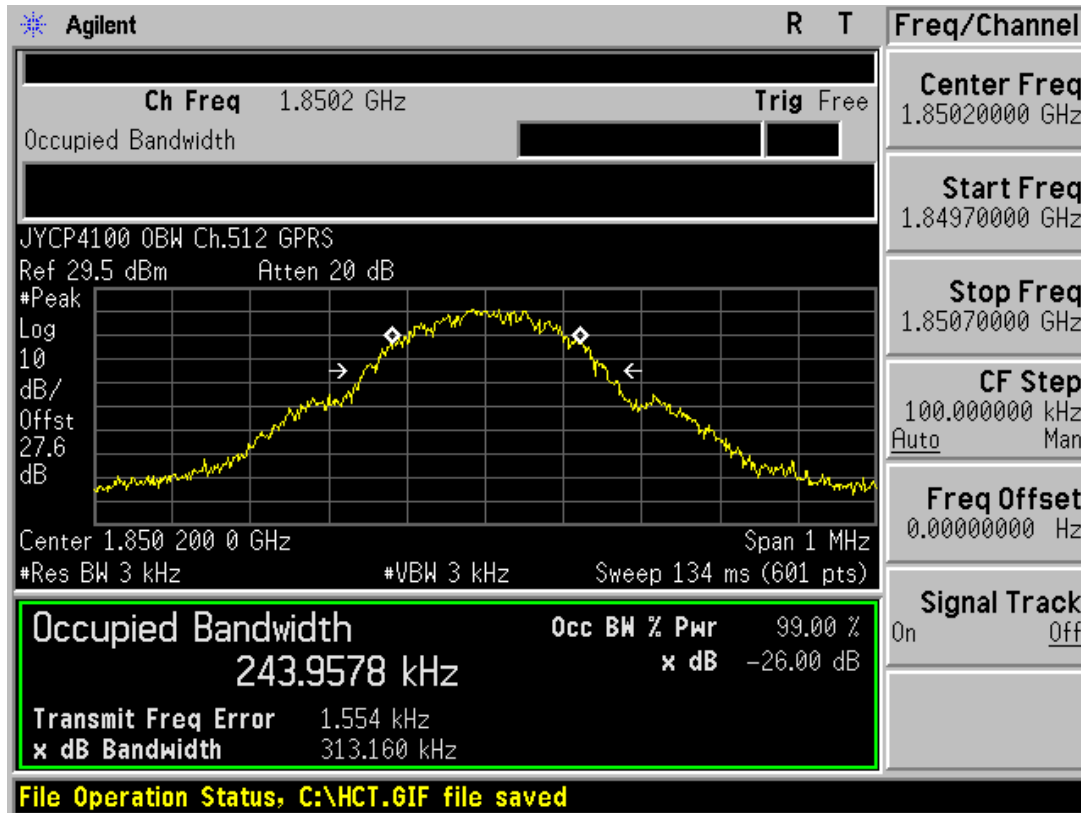


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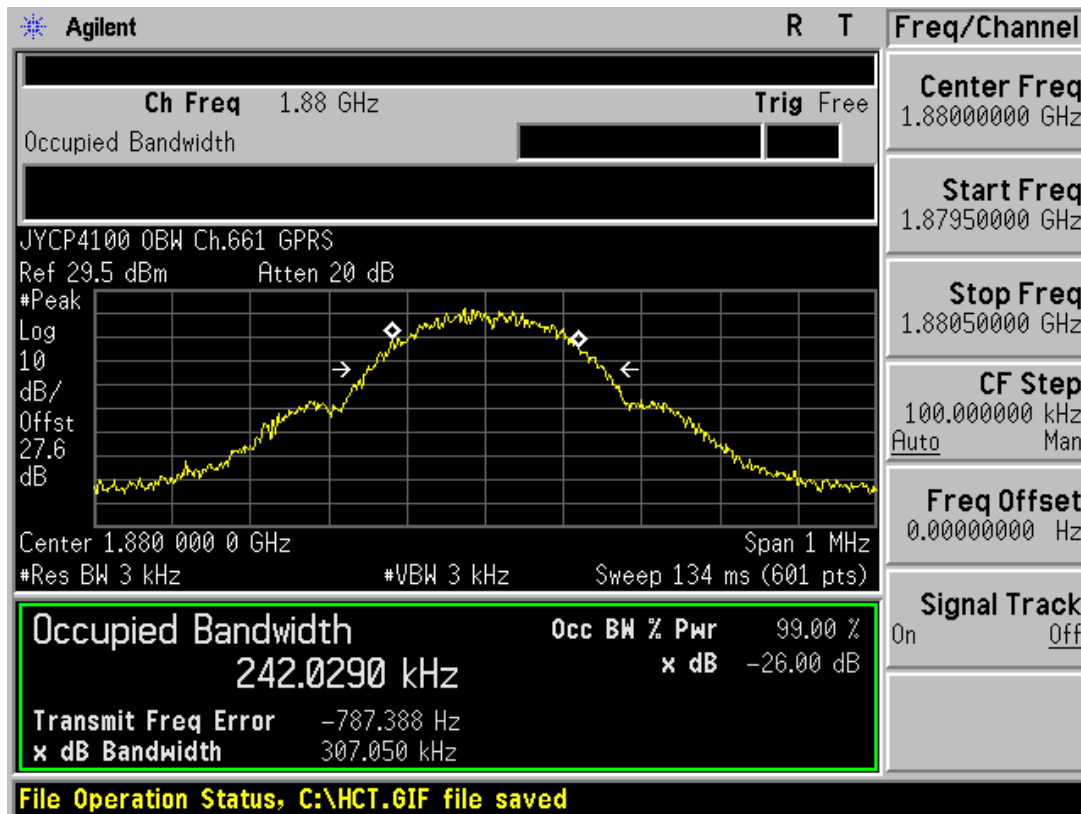
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Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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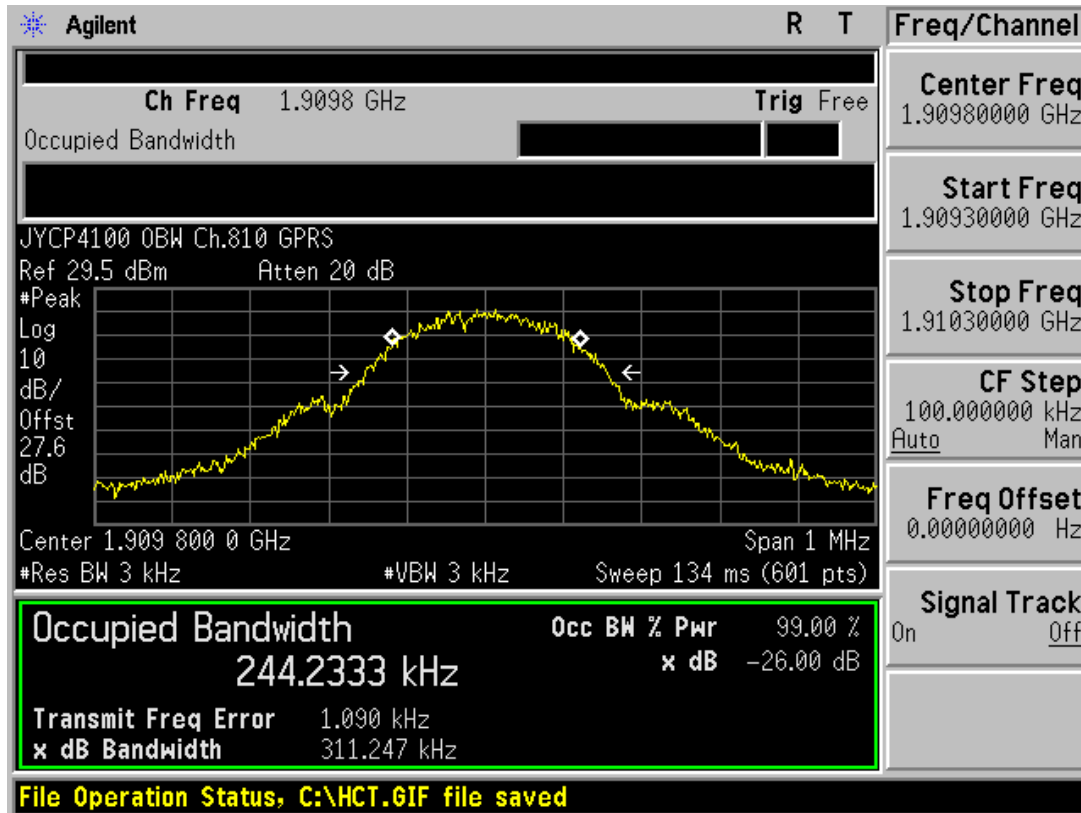
■ GSM1900 MODE (512 CH.) Occupied Bandwidth



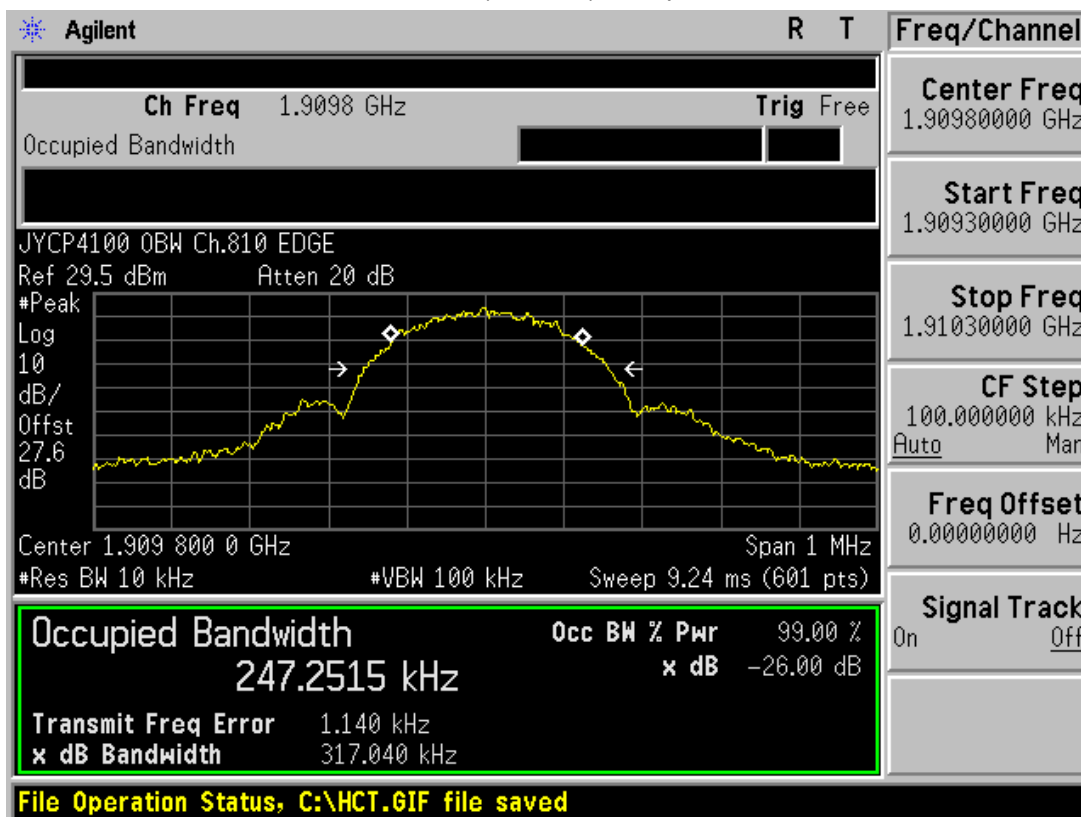
■ GSM1900 MODE (661 CH.) Occupied Bandwidth



■ GSM1900 MODE (810 CH.) Occupied Bandwidth



■ GSM1900 EDGE (810 CH.) Occupied Bandwidth

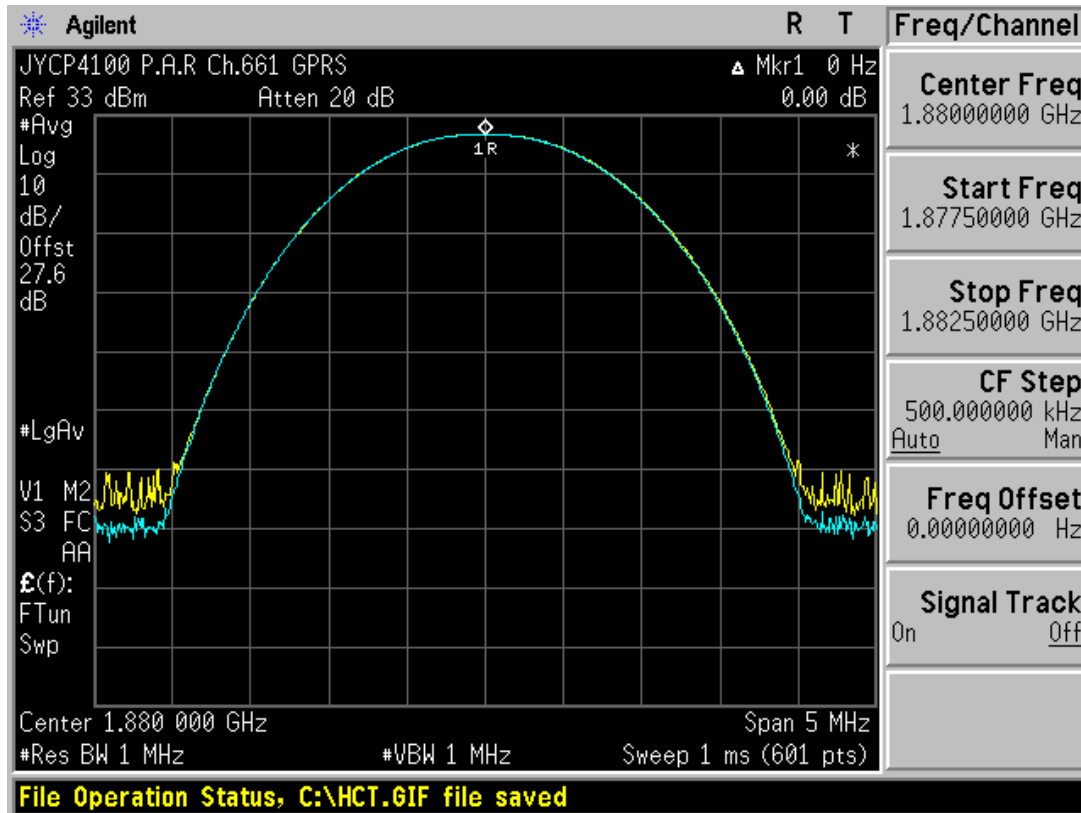


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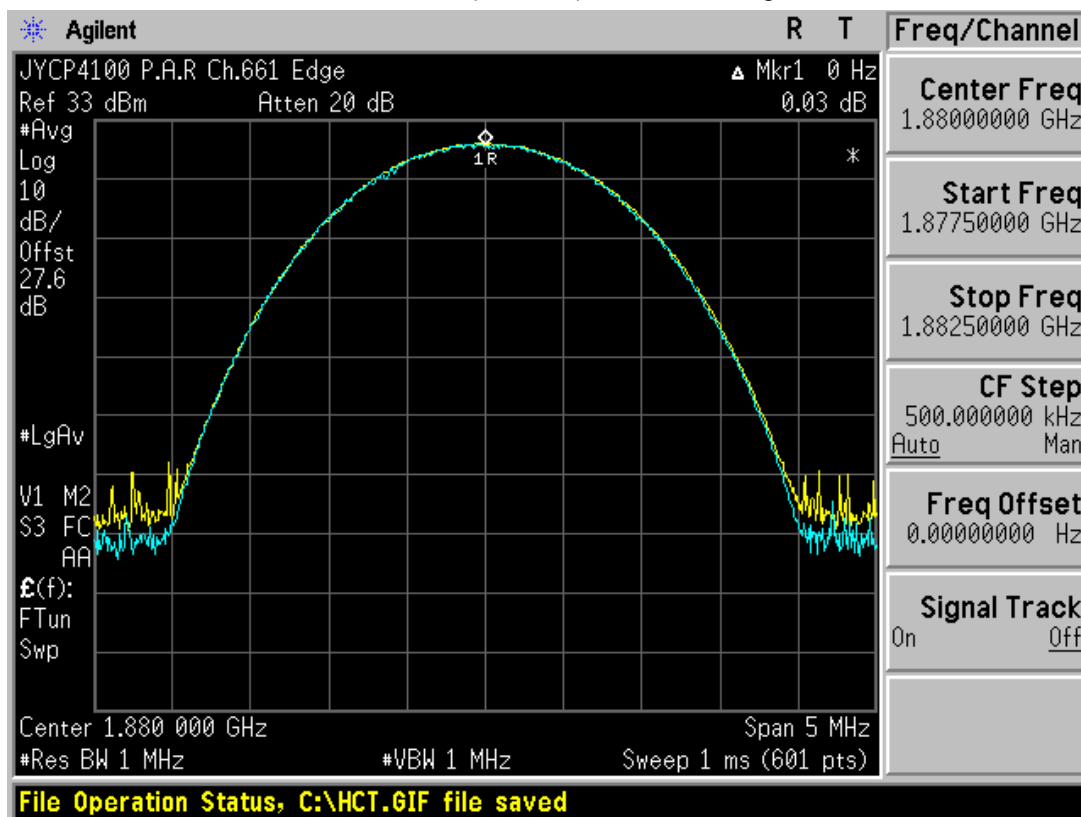
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Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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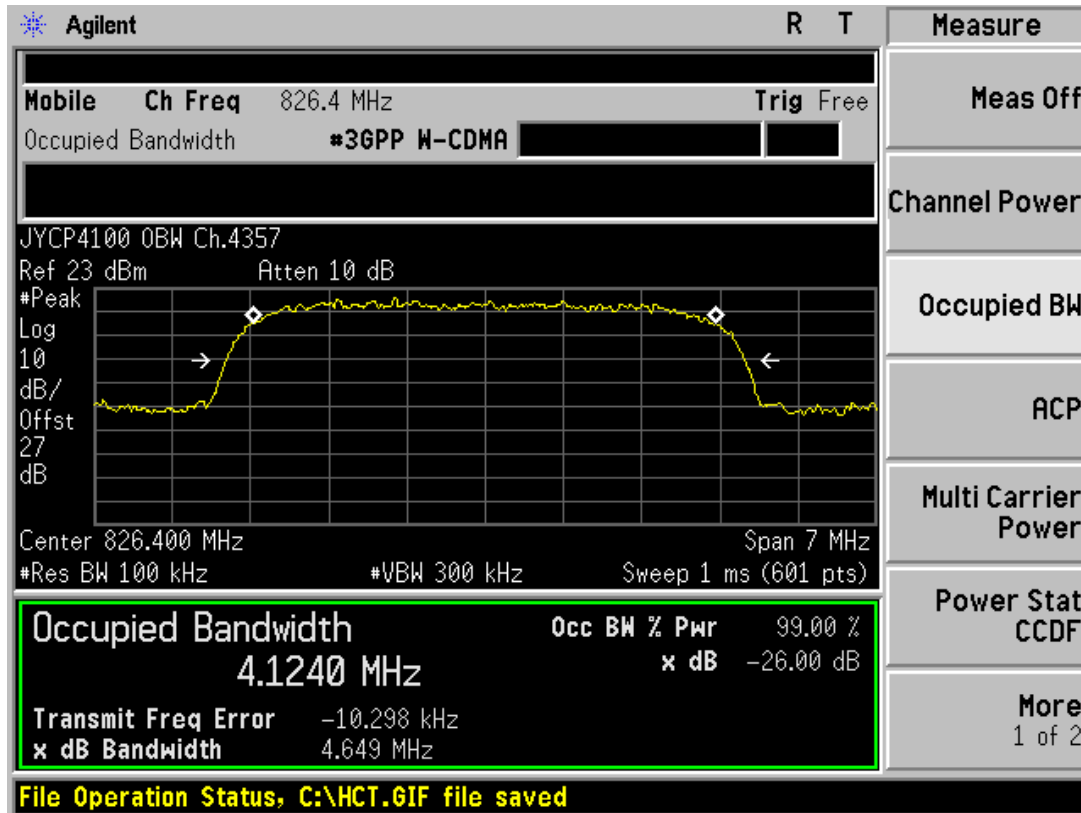
■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio



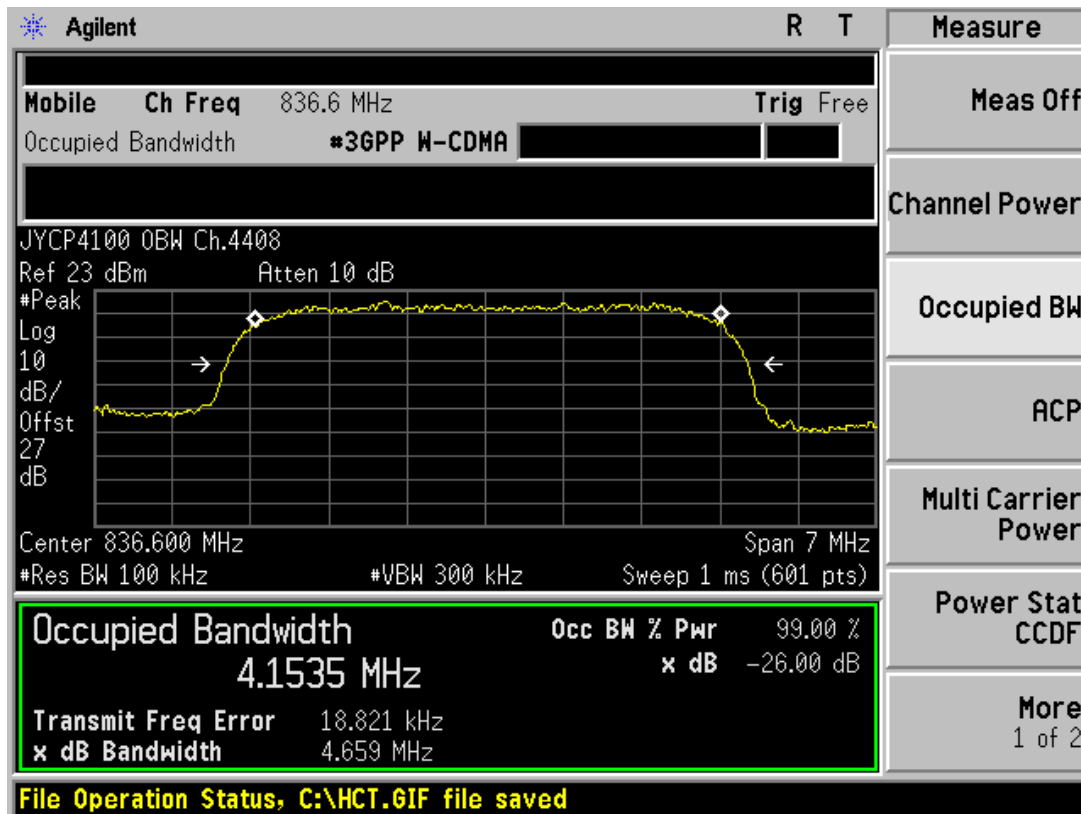
■ GSM1900 EDGE (661 CH.) Peak-to-Average Ratio



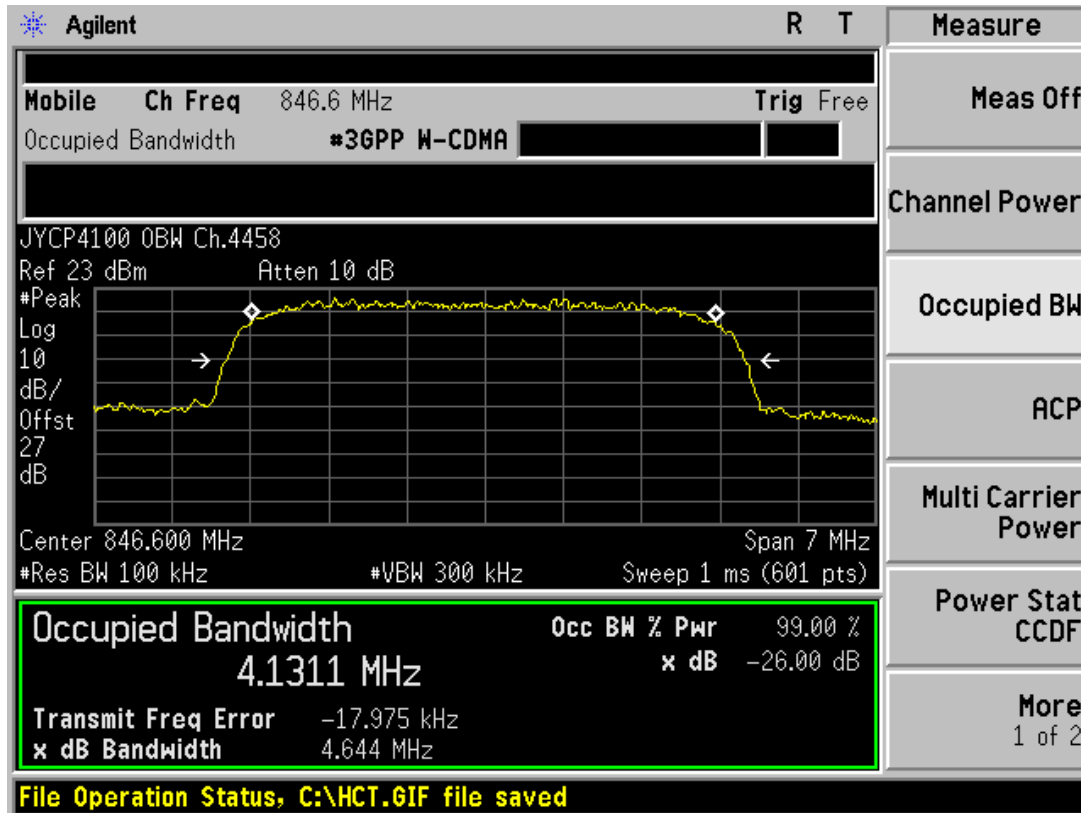
■ WCDMA850 MODE (4132 CH.) Occupied Bandwidth



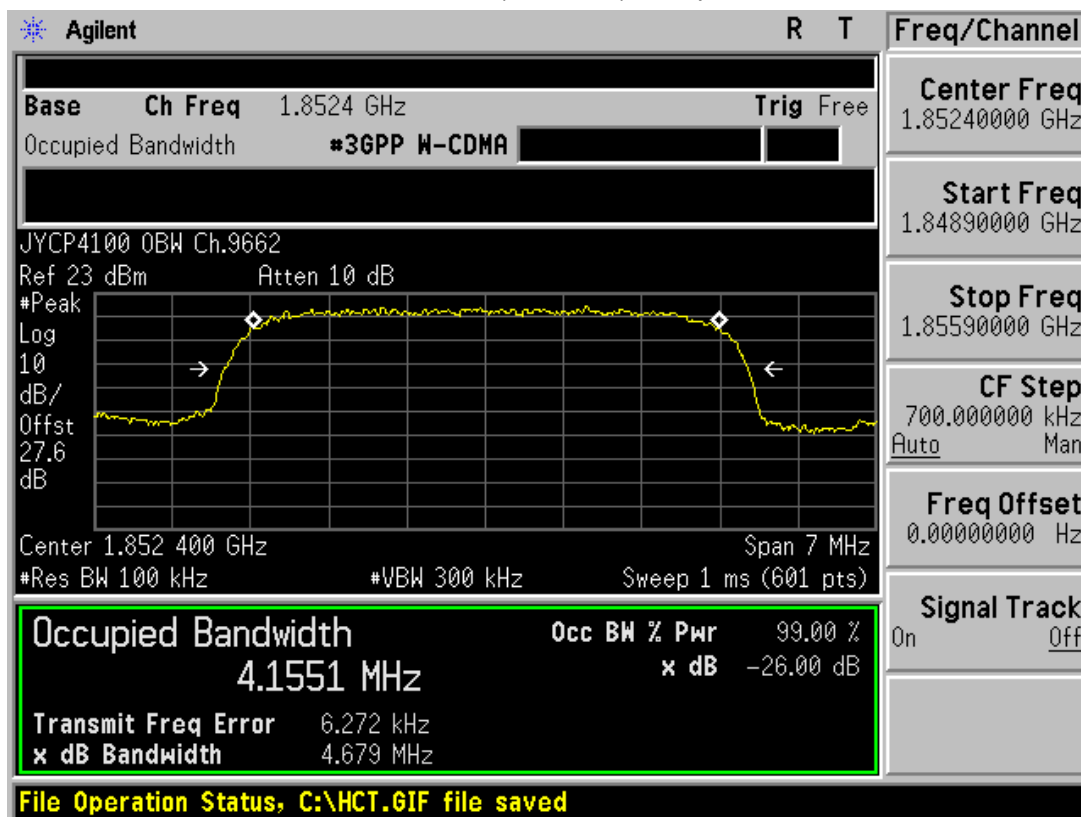
■ WCDMA850 MODE (4183 CH.) Occupied Bandwidth



■ WCDMA850MODE (4233 CH.) Occupied Bandwidth



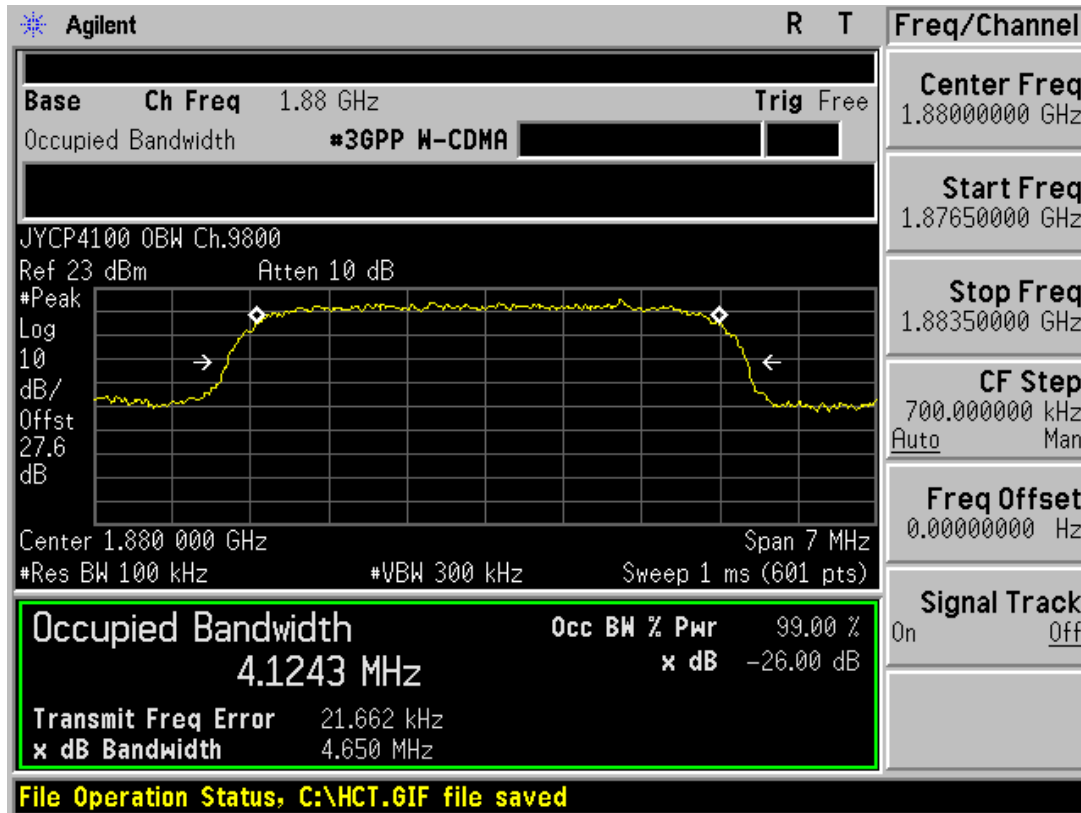
■ WCDMA1900 MODE (9262 CH.) Occupied Bandwidth



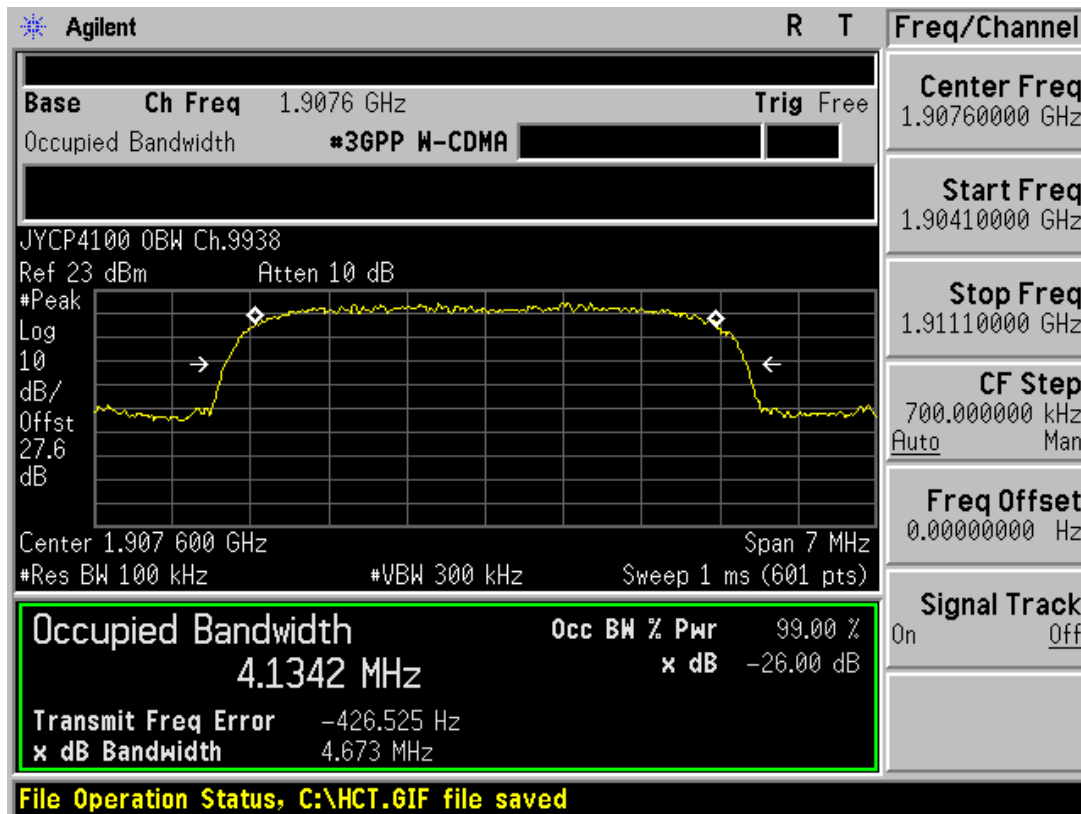
FCC CERTIFICATION REPORT

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	www.hct.co.kr FCC ID: JYCP4100
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■ WCDMA1900 MODE (9400 CH.) Occupied Bandwidth



■ WCDMA1900 MODE (9538 CH.) Occupied Bandwidth

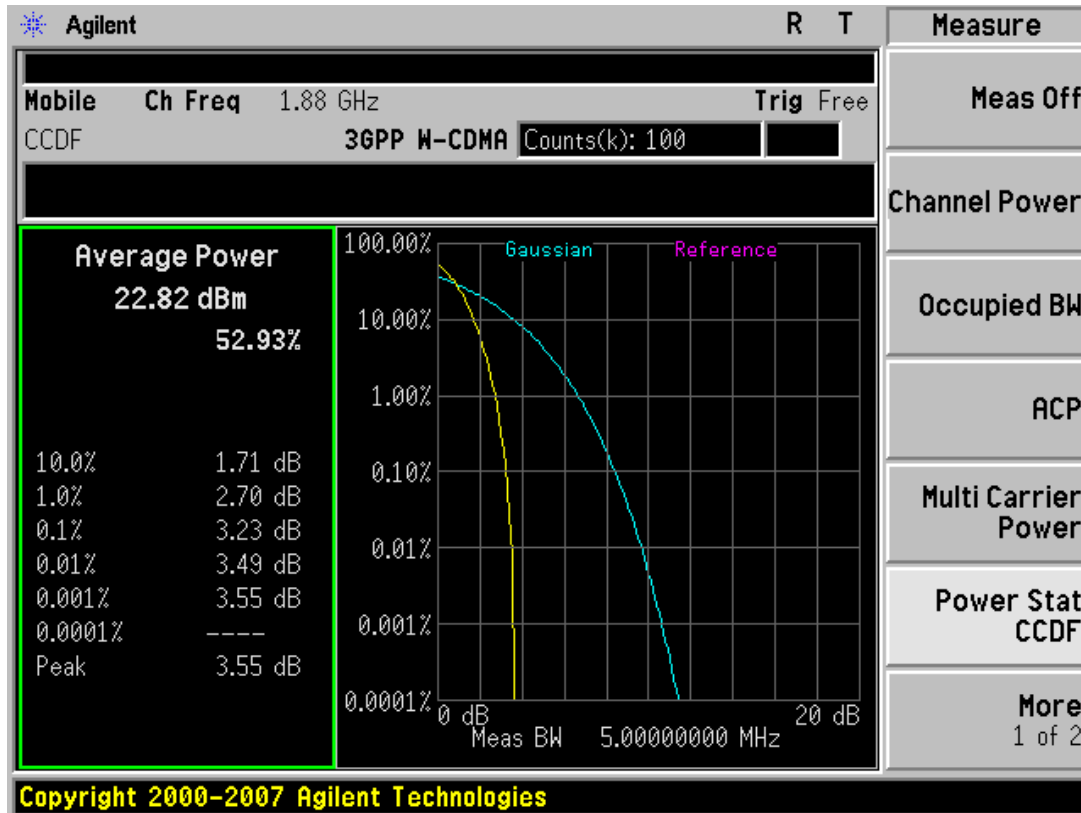


FCC CERTIFICATION REPORT

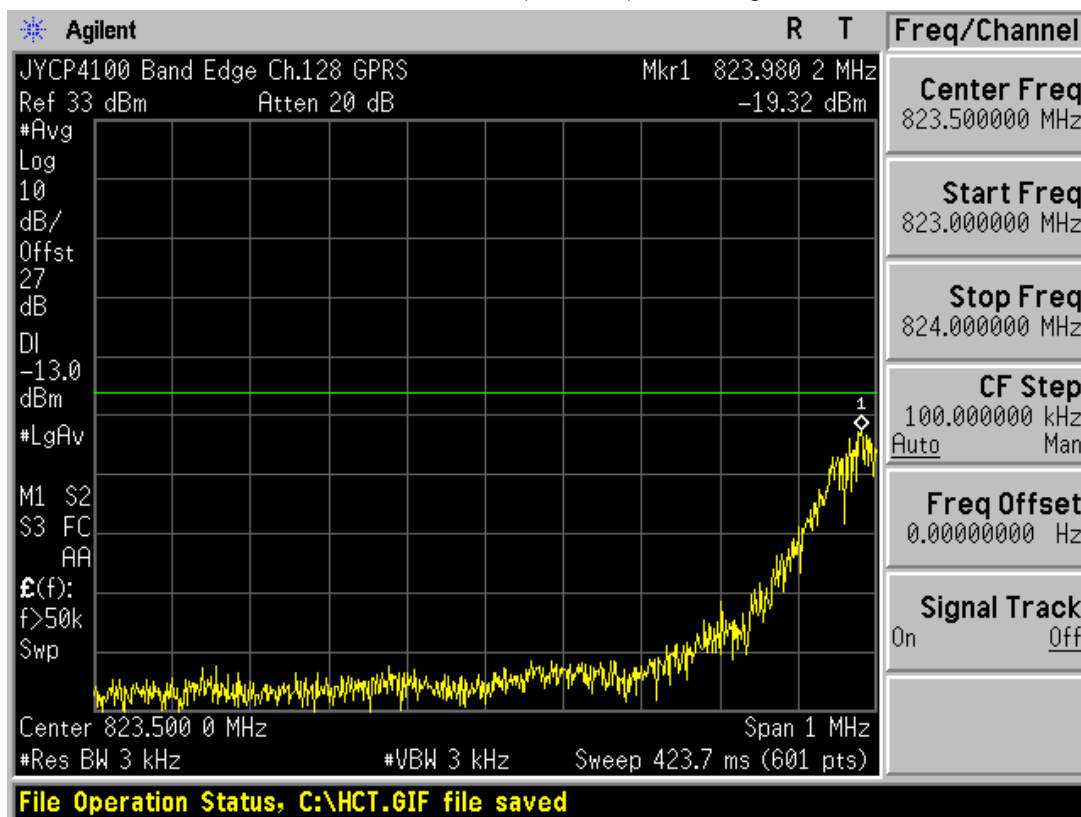
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Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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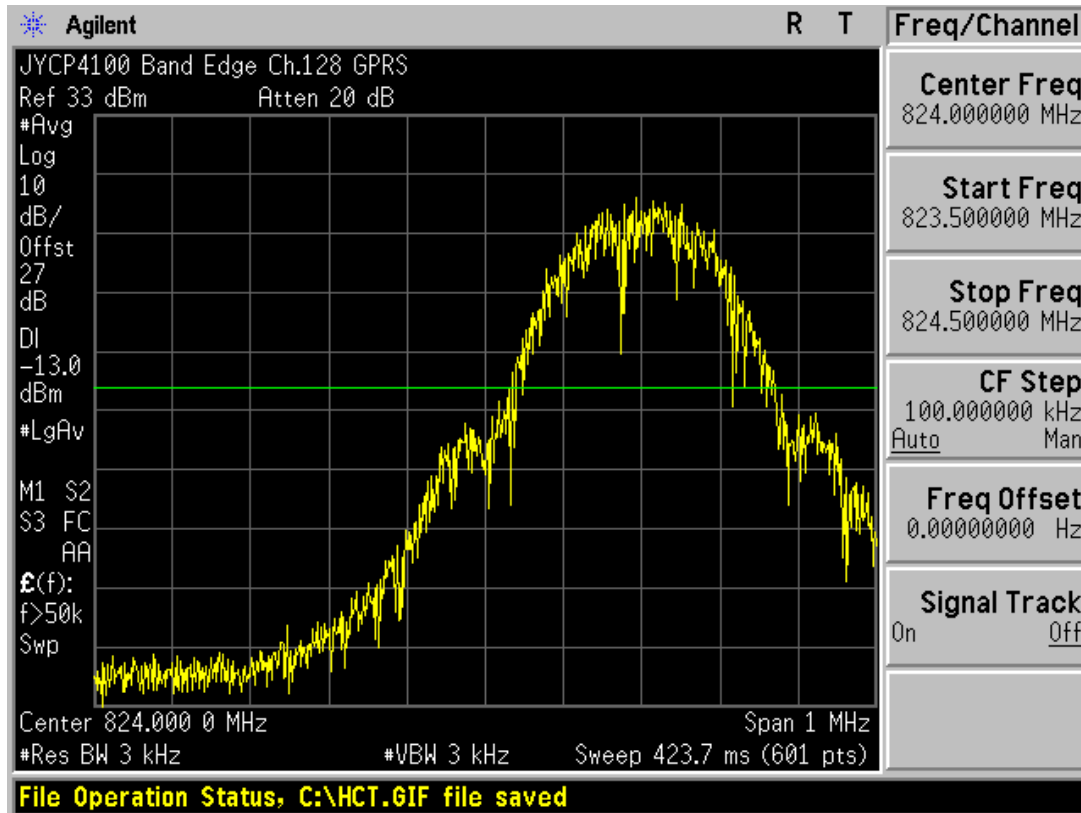
■ WCDMA1900 MODE (9400 CH.) Peak-to-Average Ratio



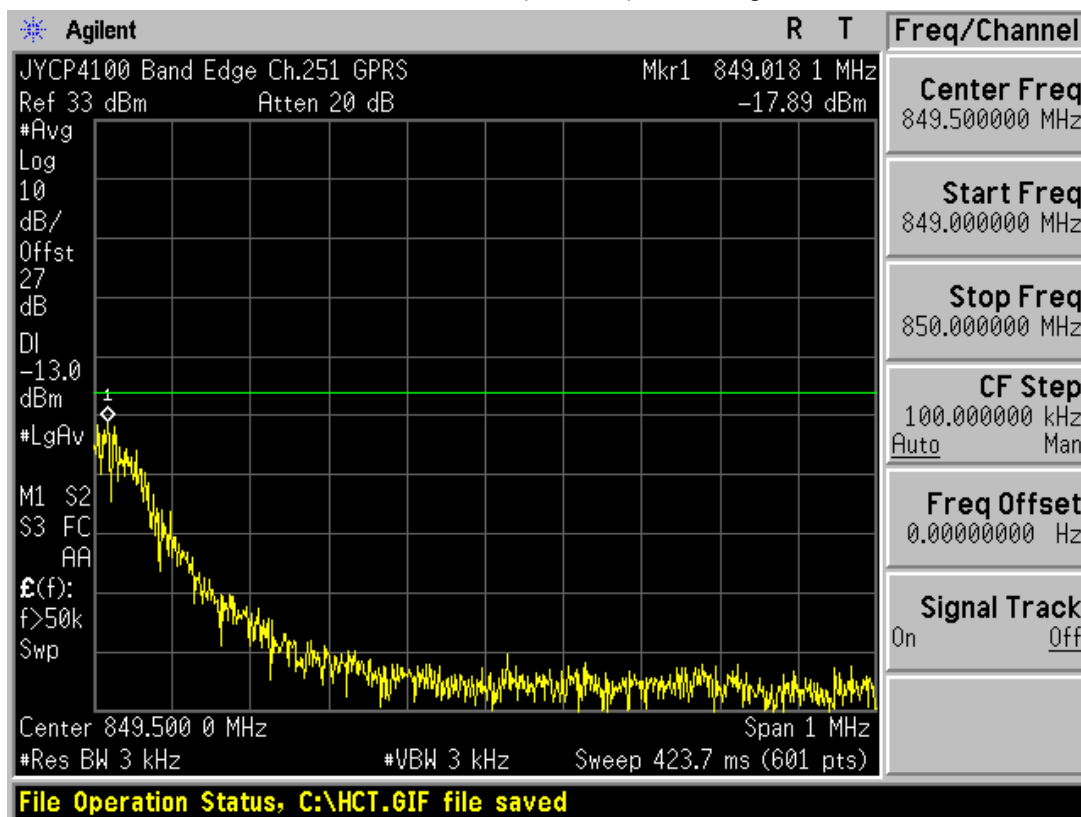
■ GSM850 MODE (128 CH.) Block Edge 1



■ GSM850 MODE (128 CH.) Block Edge 2



■ GSM850 MODE (251 CH.) Block Edge 1



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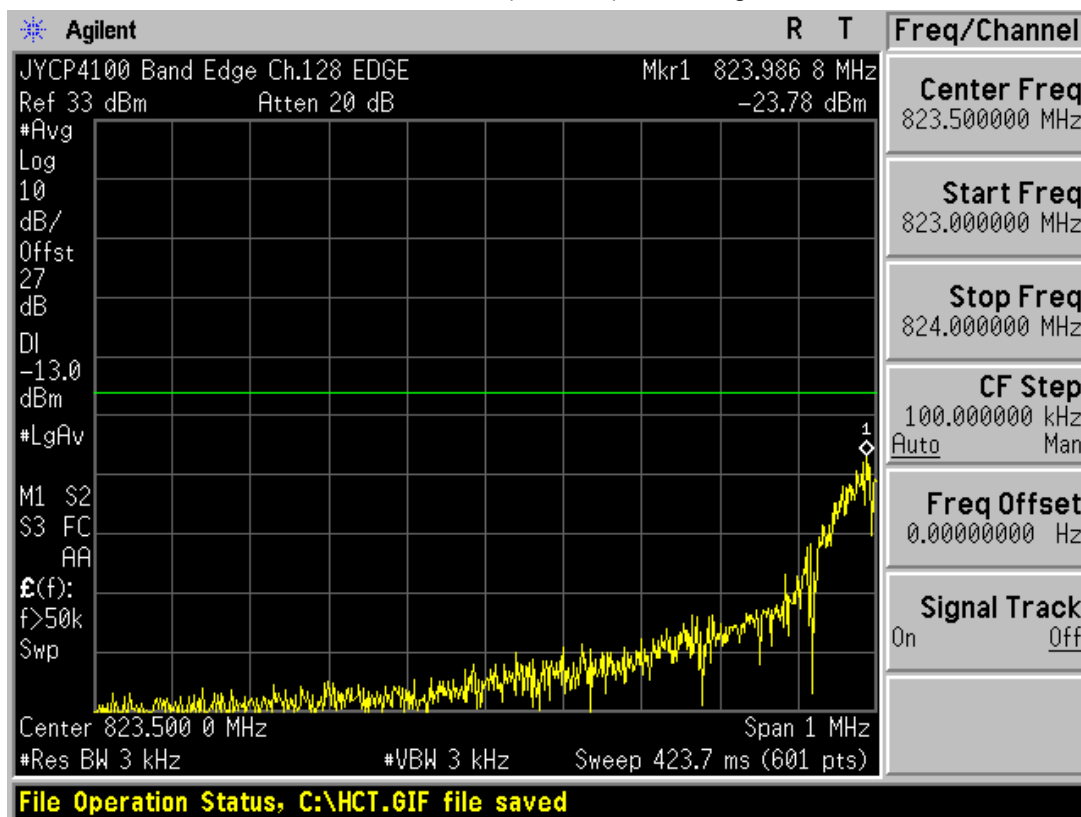
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Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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■ GSM850 MODE (251 CH.) Block Edge 2



■ EDGE MODE (128 CH.) Block Edge 1

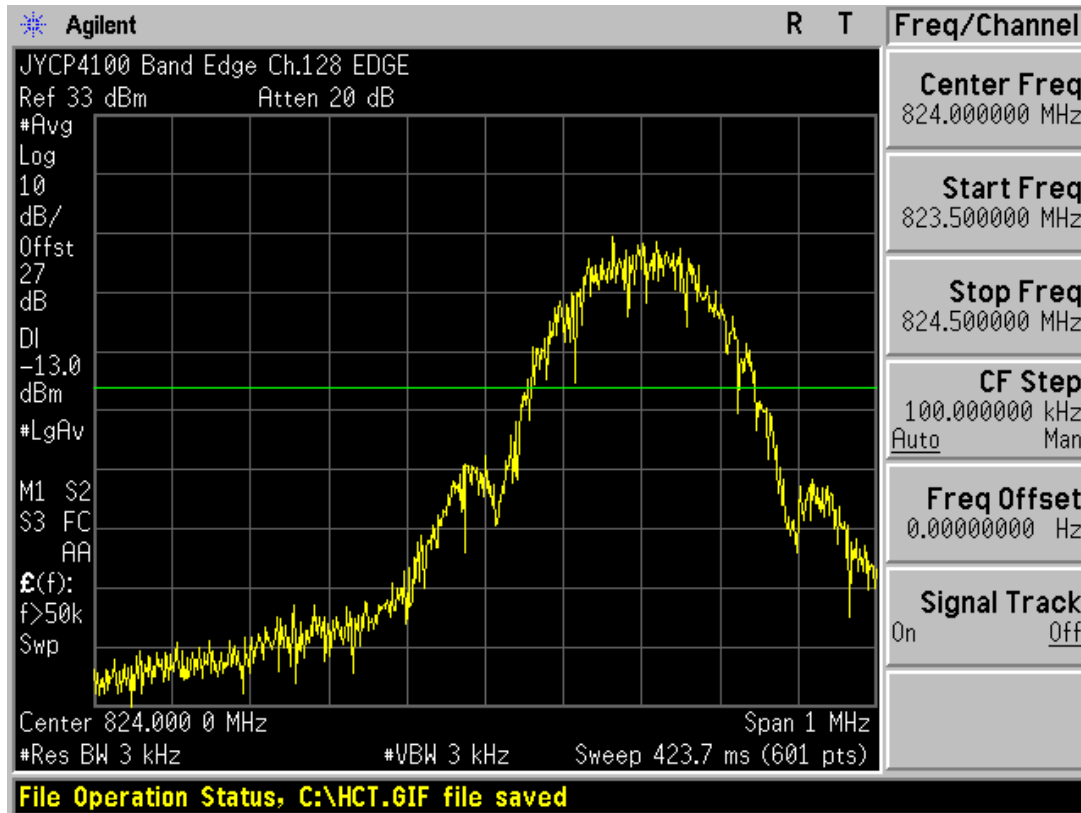


FCC CERTIFICATION REPORT

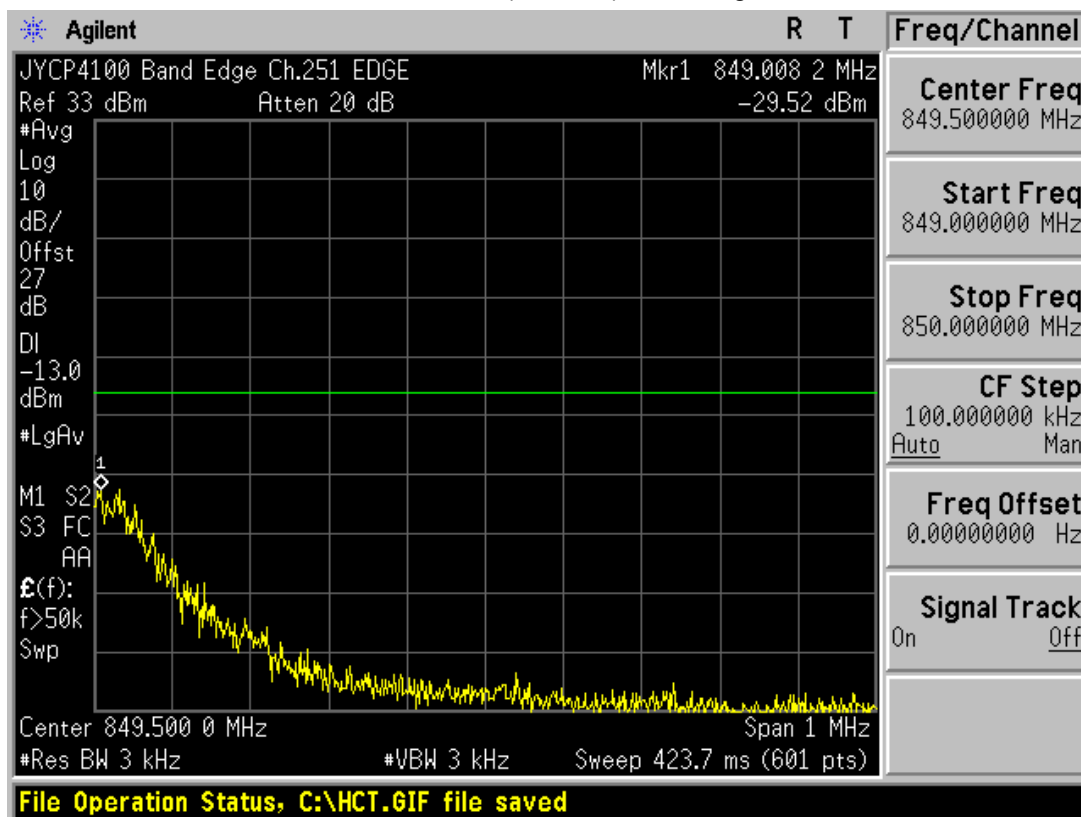
www.hct.co.kr

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
---------------------------------	--------------------------------------	--	---------------------

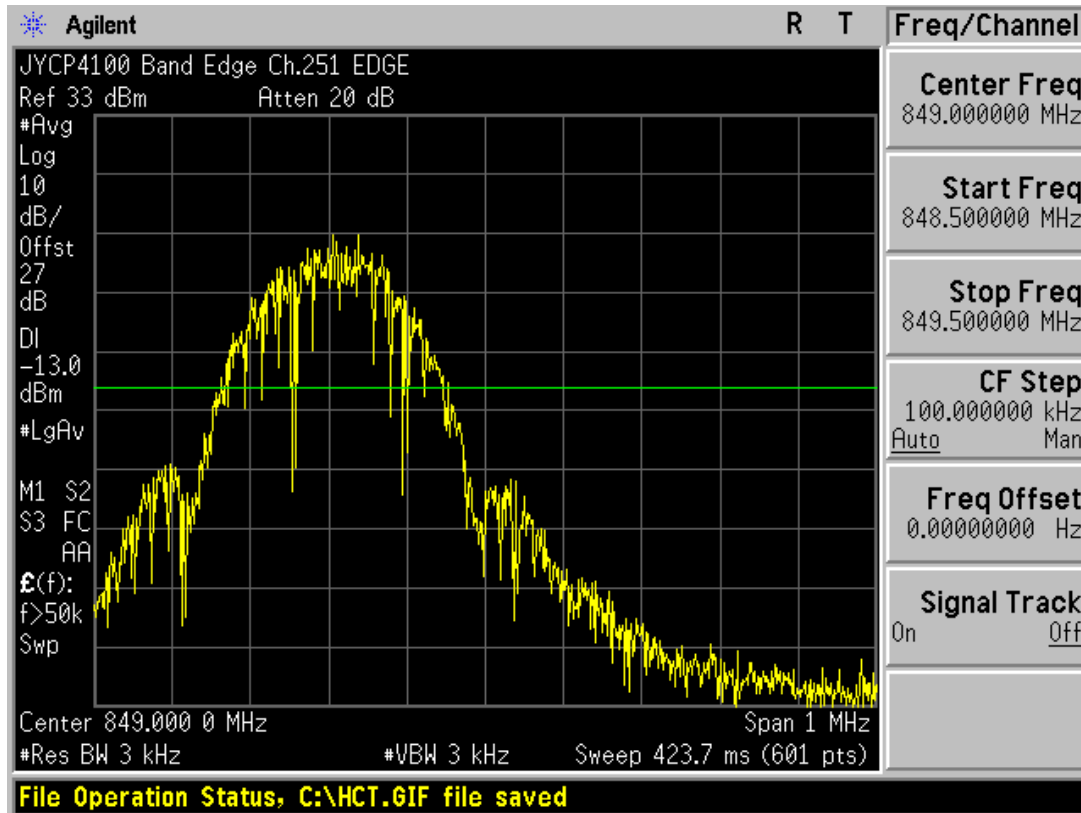
■ EDGE MODE (128 CH.) Block Edge 2



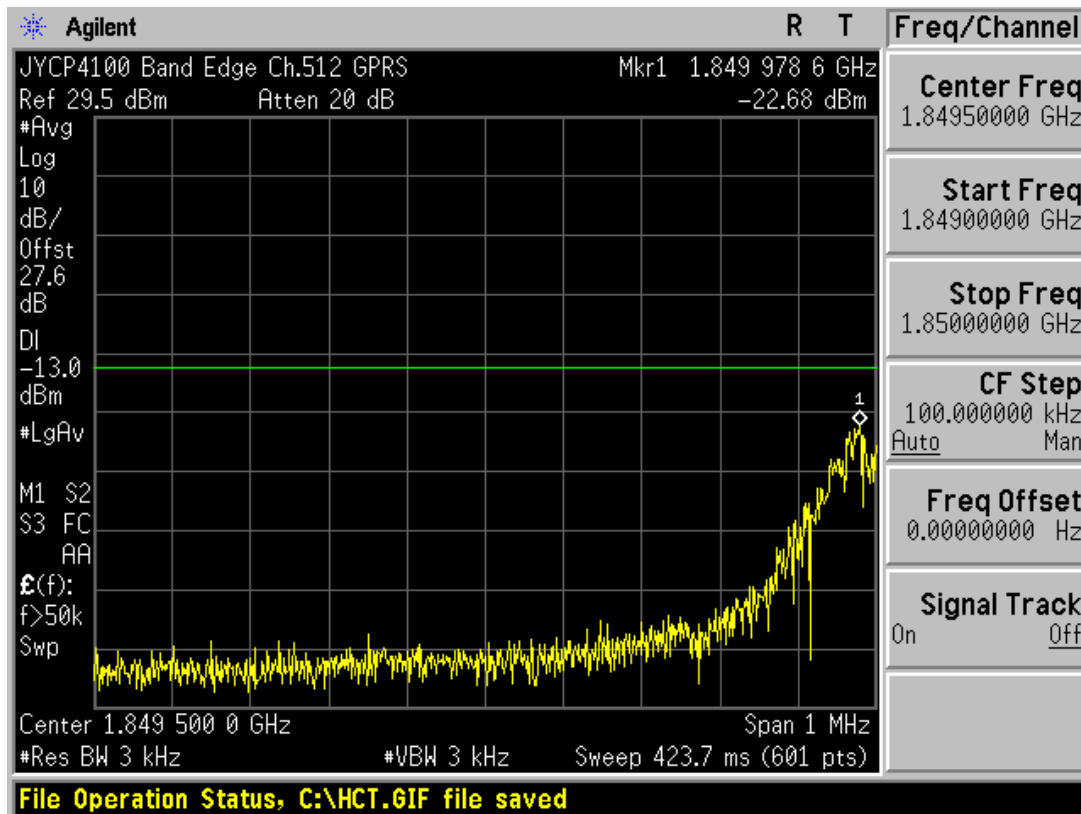
■ EDGE MODE (251 CH.) Block Edge 1



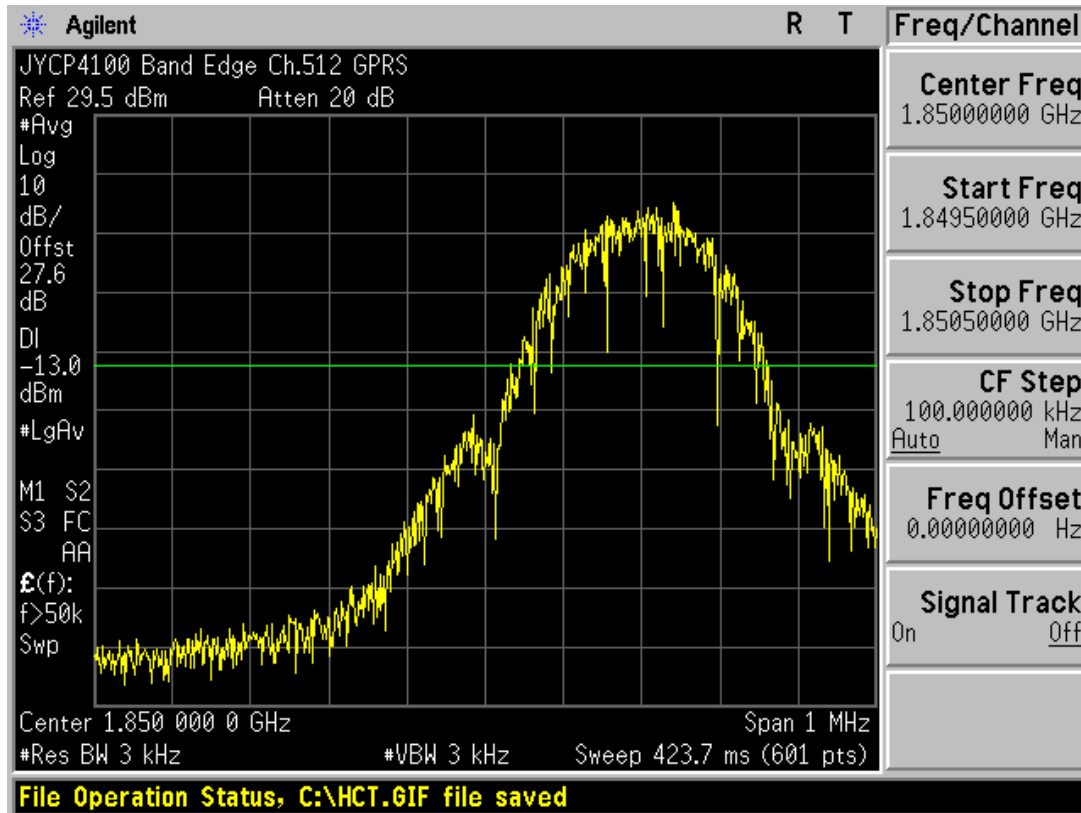
■ EDGE MODE (251 CH.) Block Edge 2



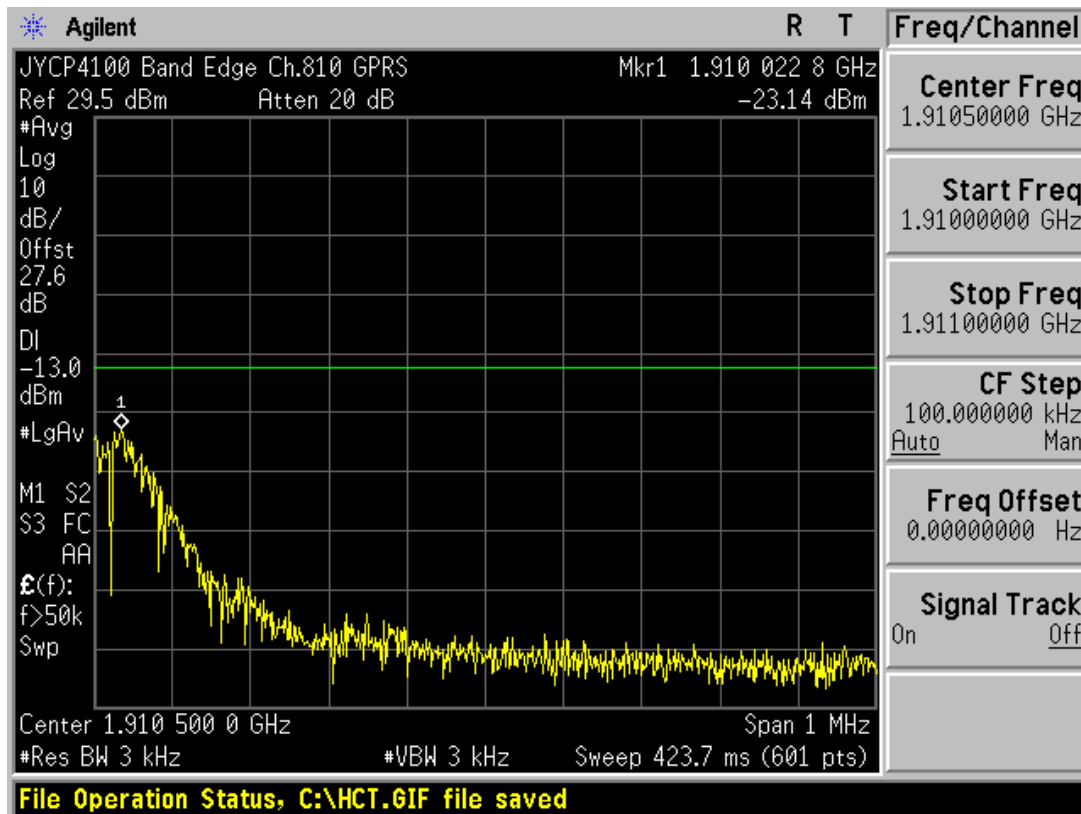
■ GSM1900 MODE (512 CH.) Block Edge 1



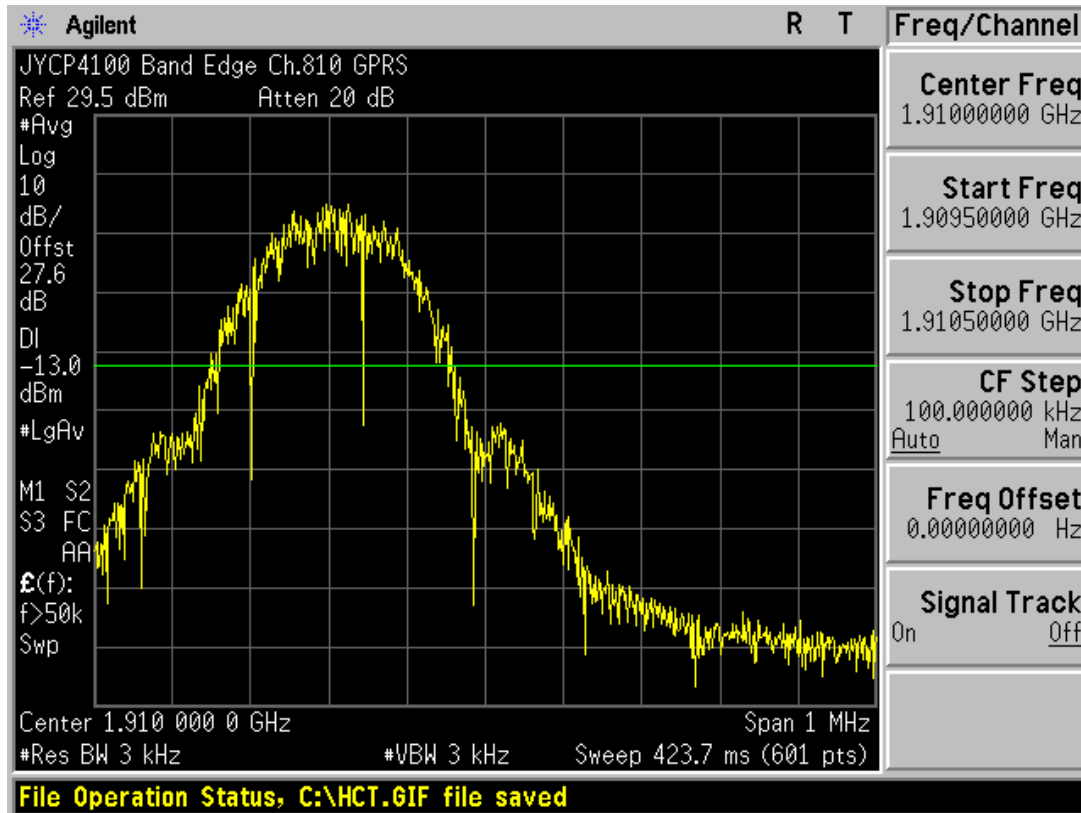
■ GSM1900 MODE (512 CH.) Block Edge 2



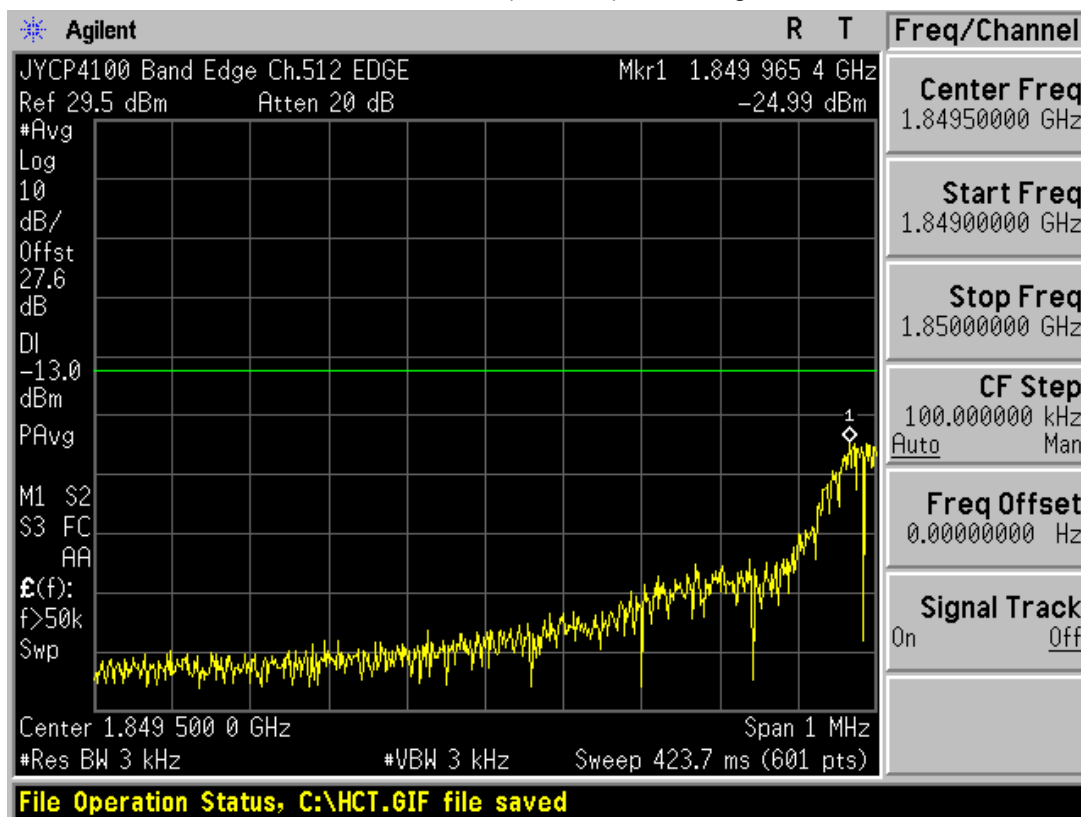
■ GSM1900 MODE (810 CH.) Block Edge 1



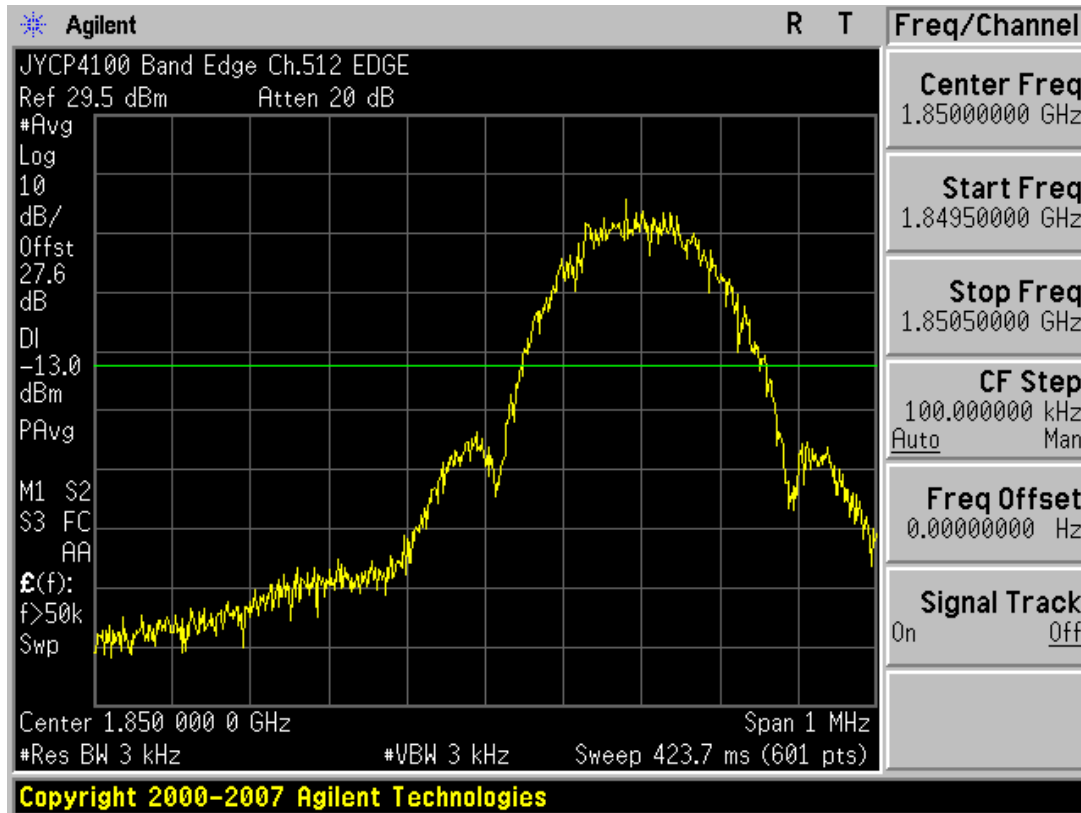
■ GSM1900 MODE (810 CH.) Block Edge 2



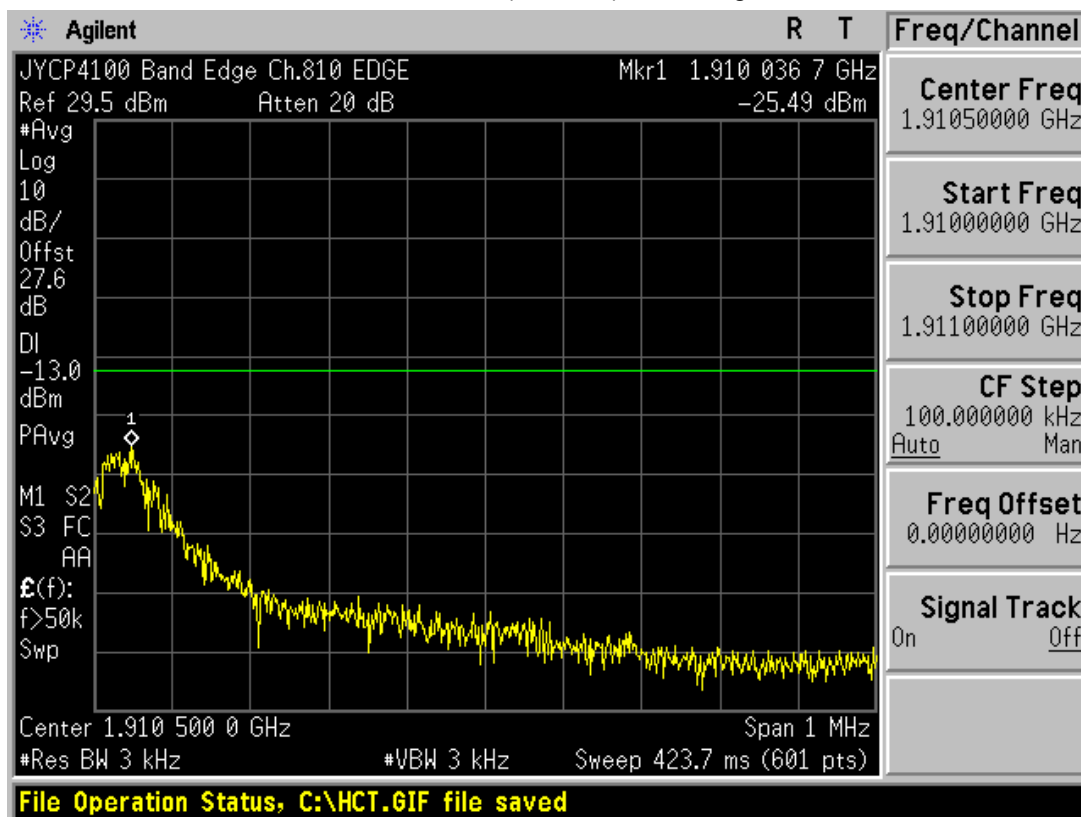
■ EDGE MODE (512 CH.) Block Edge 1



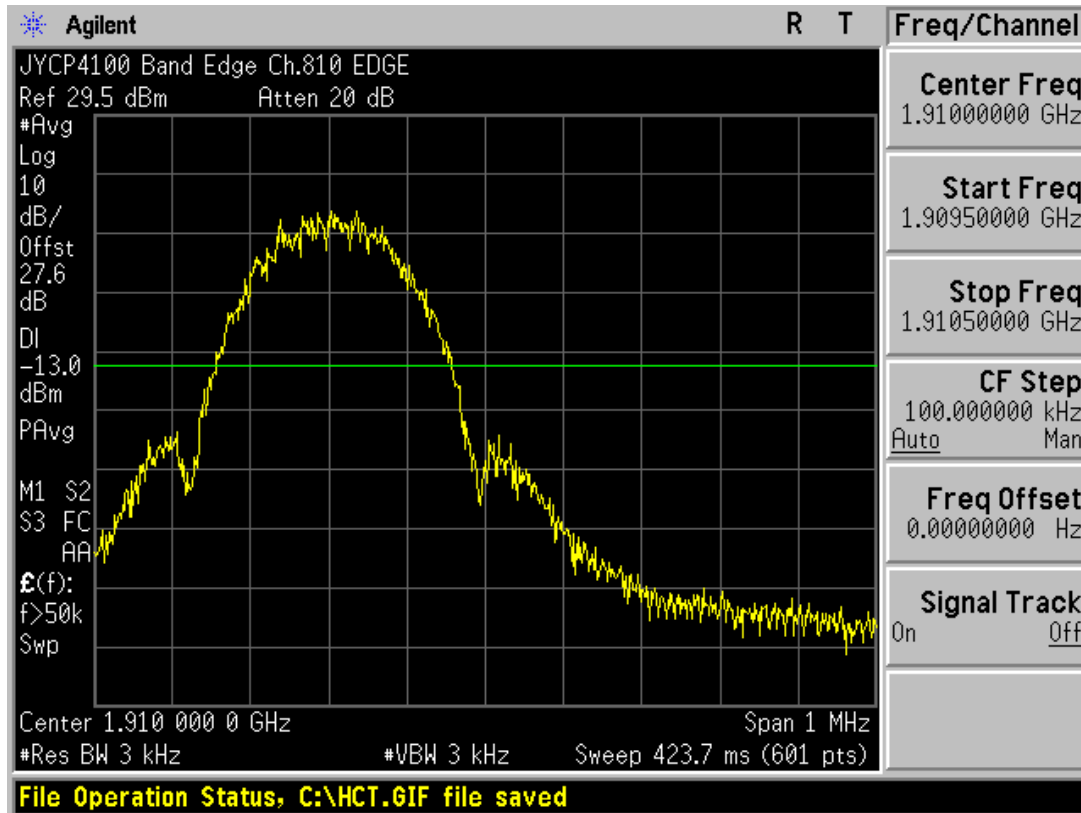
■ EDGE MODE (512 CH.) Block Edge 2



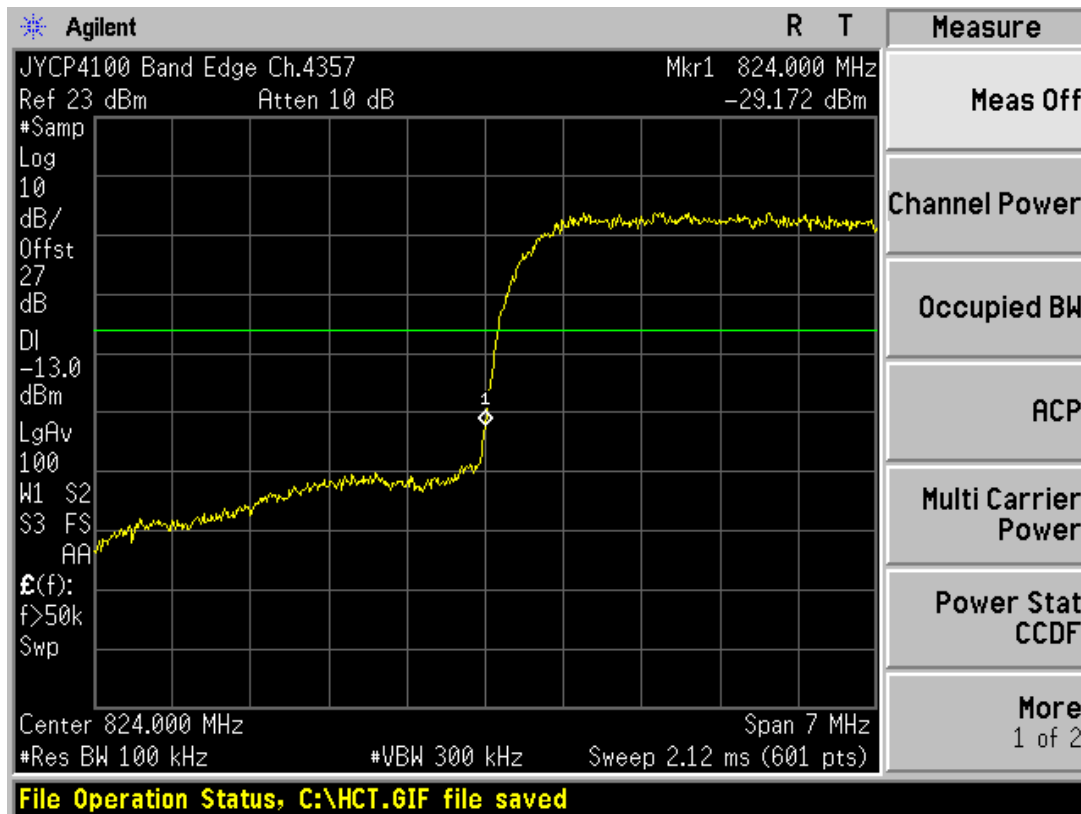
■ EDGE MODE (810 CH.) Block Edge 1



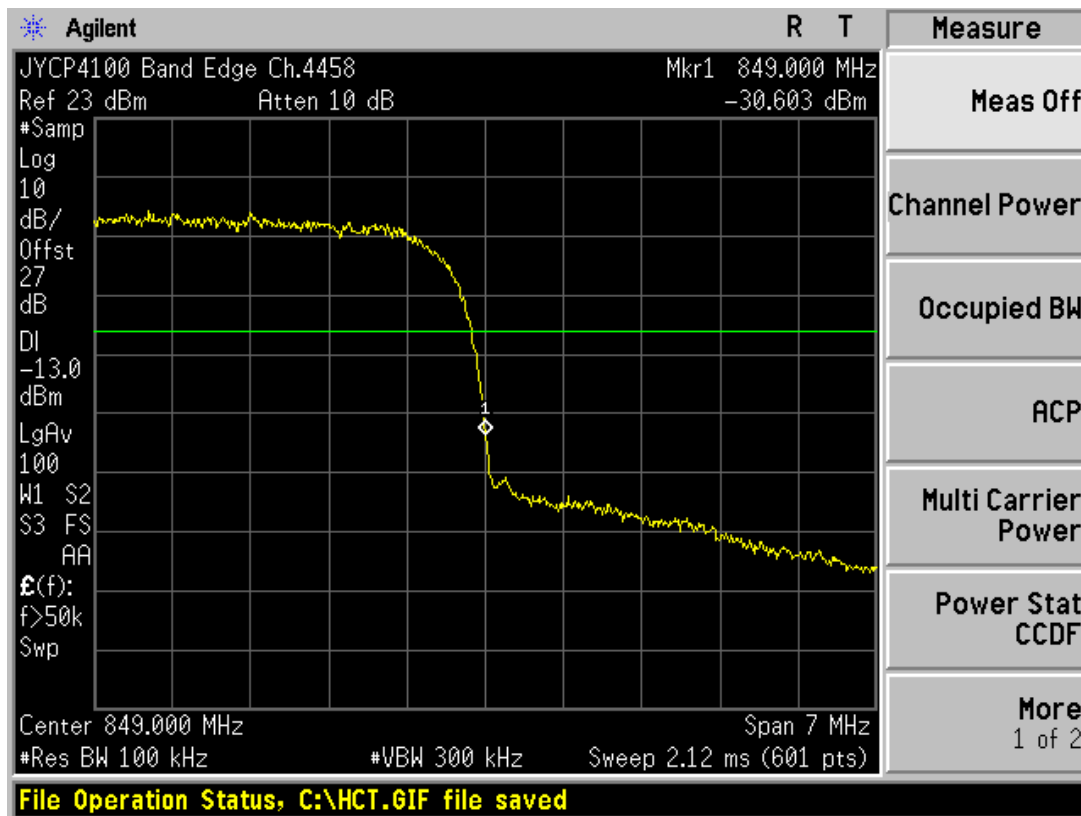
■ EDGE MODE (810 CH.) Block Edge 2



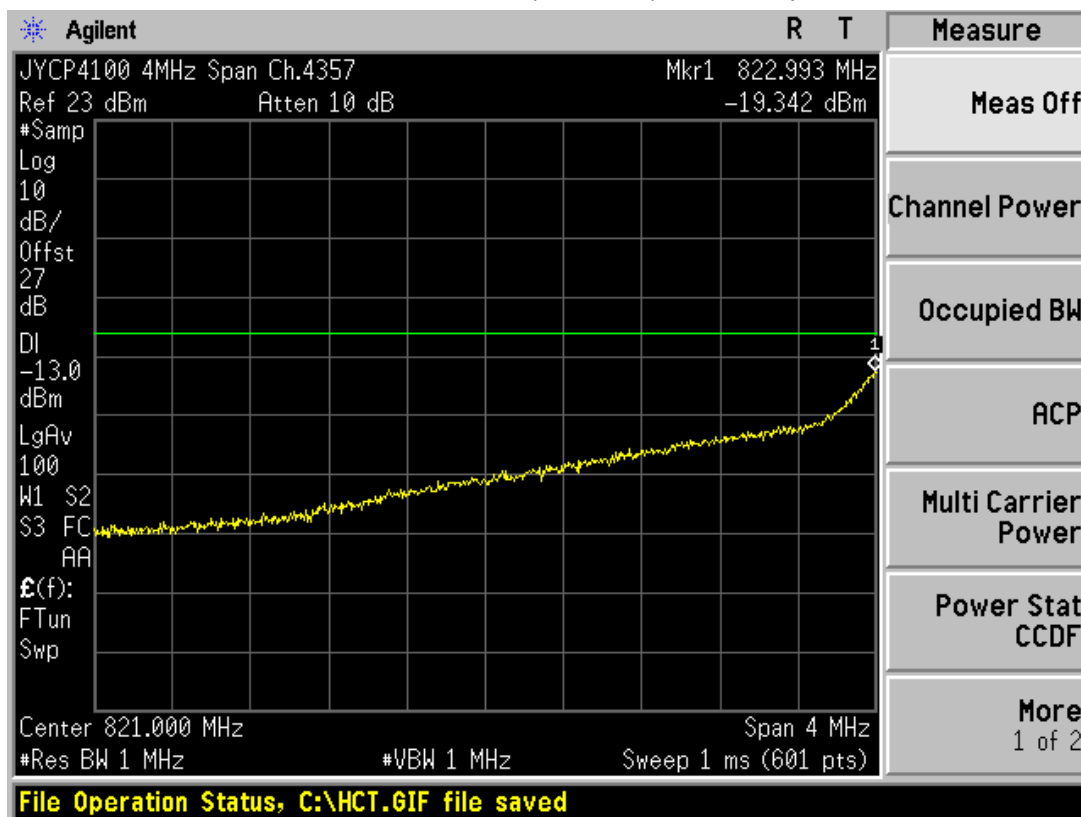
■ WCDMA850 MODE (4132 CH.) Block Edge



■ WCDMA850MODE (4233 CH.) Block Edge



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

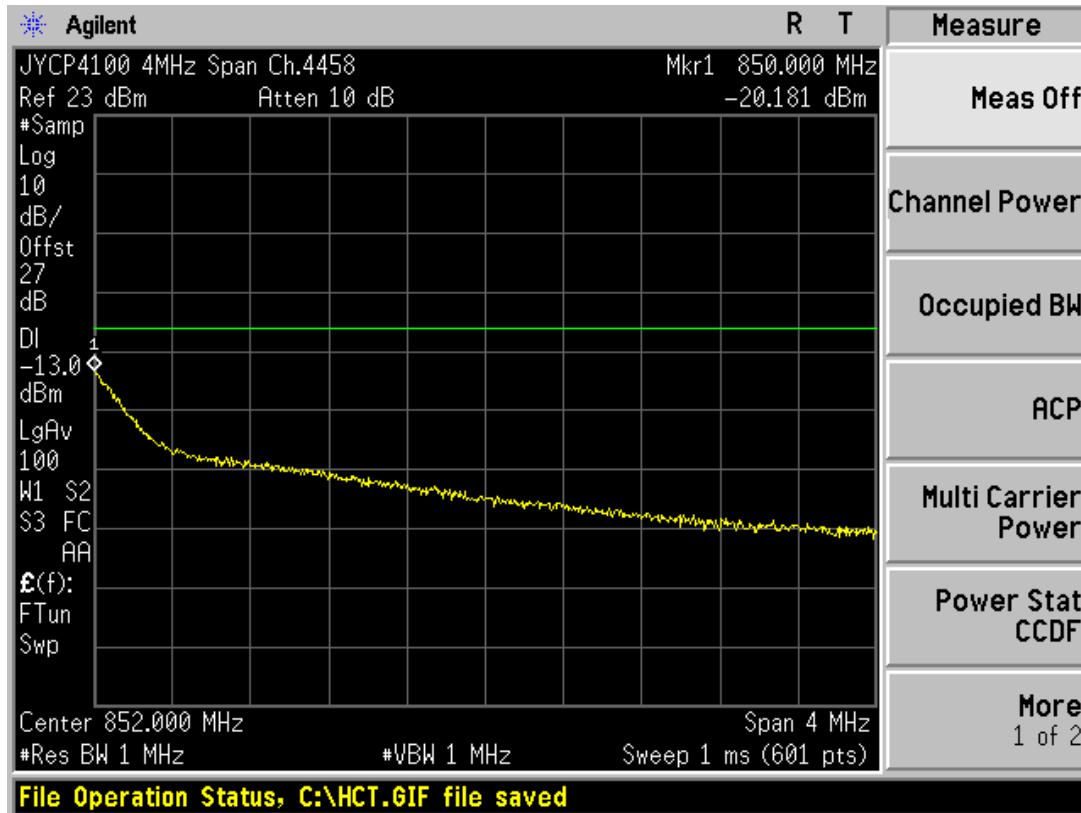


FCC CERTIFICATION REPORT

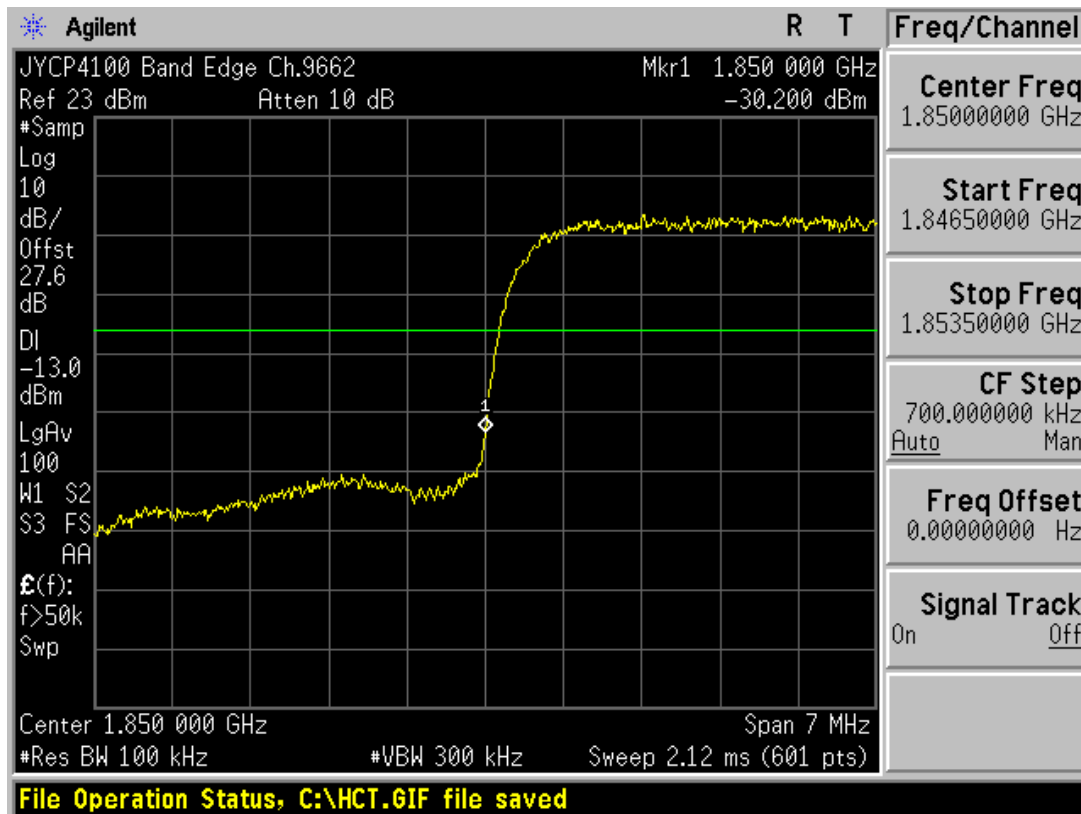
www.hct.co.kr

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
---------------------------------	--------------------------------------	--	---------------------

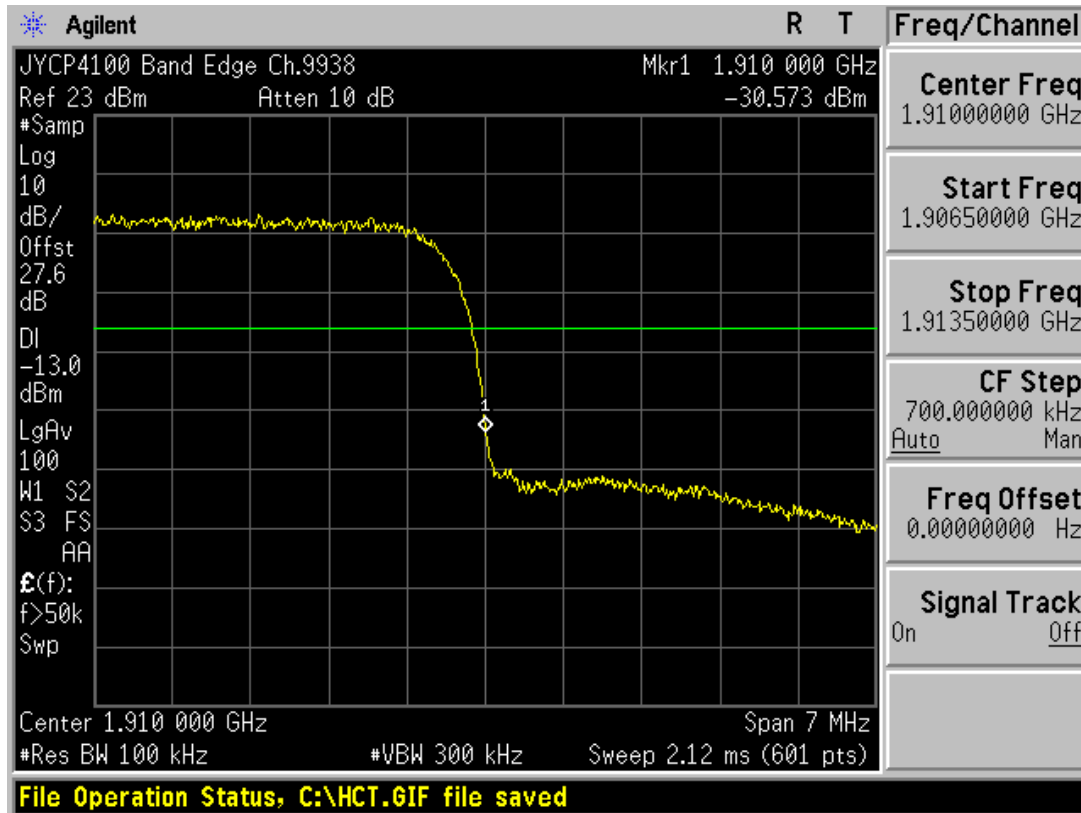
■ WCDMA850MODE (4233 CH.) – 4 MHz Span



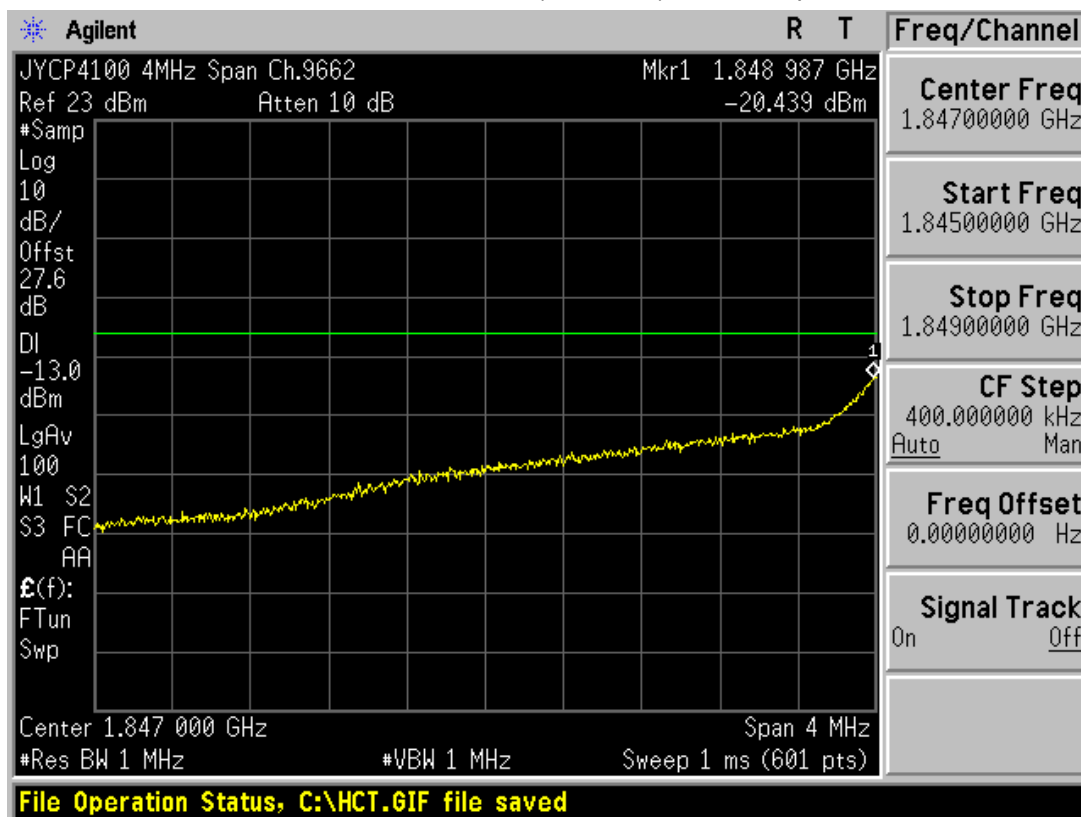
■ WCDMA1900 MODE (9262 CH.) Block Edge



■ WCDMA1900 MODE (9538 CH.) Block Edge



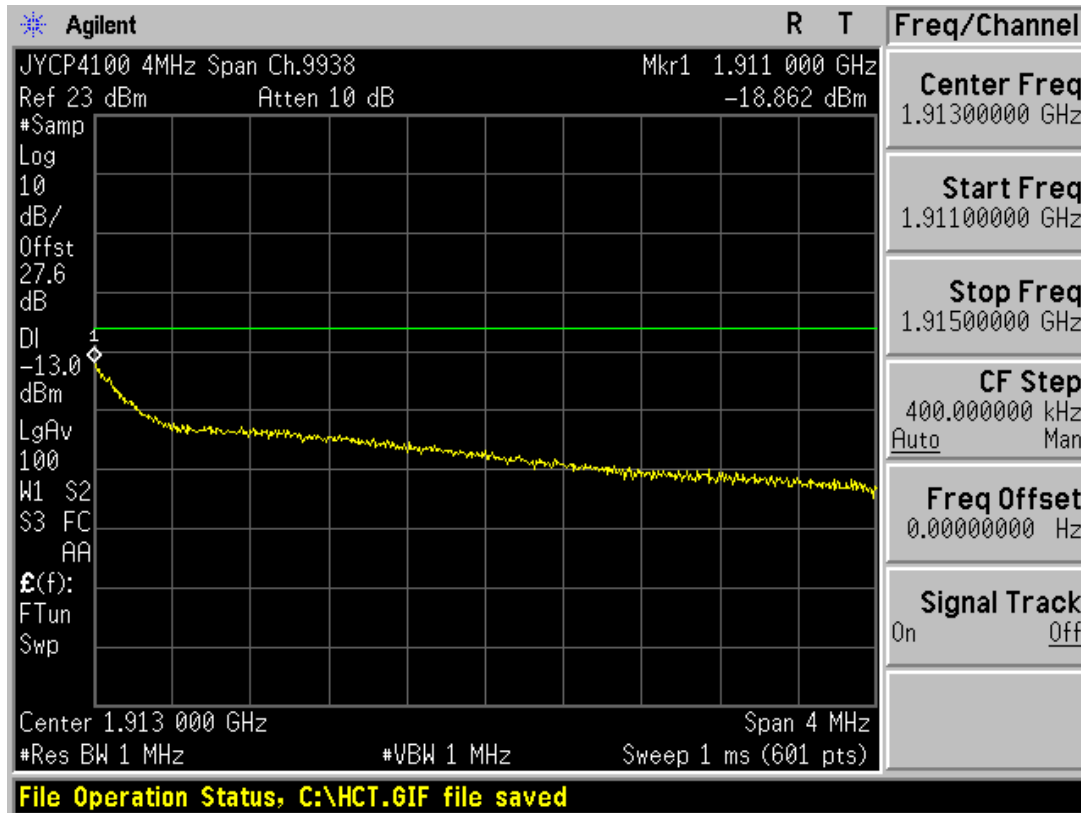
■ WCDMA1900 MODE (9262 CH.) – 4 MHz Span



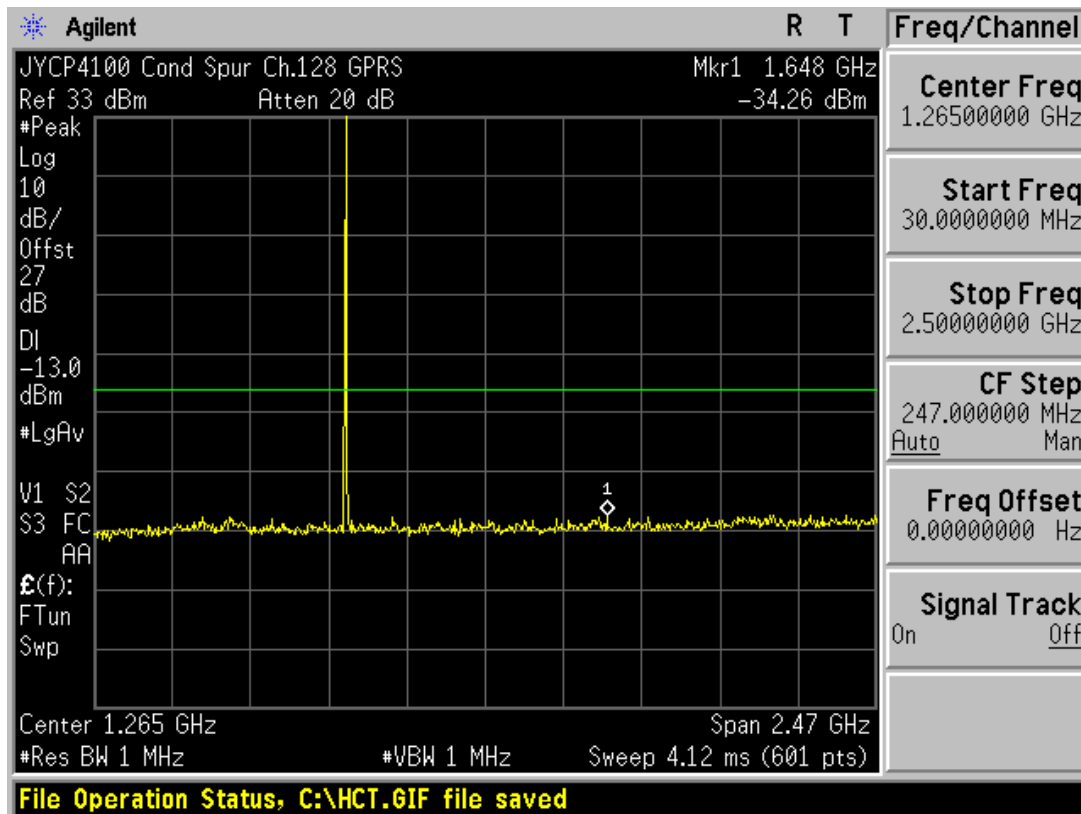
FCC CERTIFICATION REPORT

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	www.hct.co.kr FCC ID: JYCP4100
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■ WCDMA1900 MODE (9538 CH.) – 4 MHz Span



■ GSM850 MODE (128 CH.) Conducted Spurious Emissions1

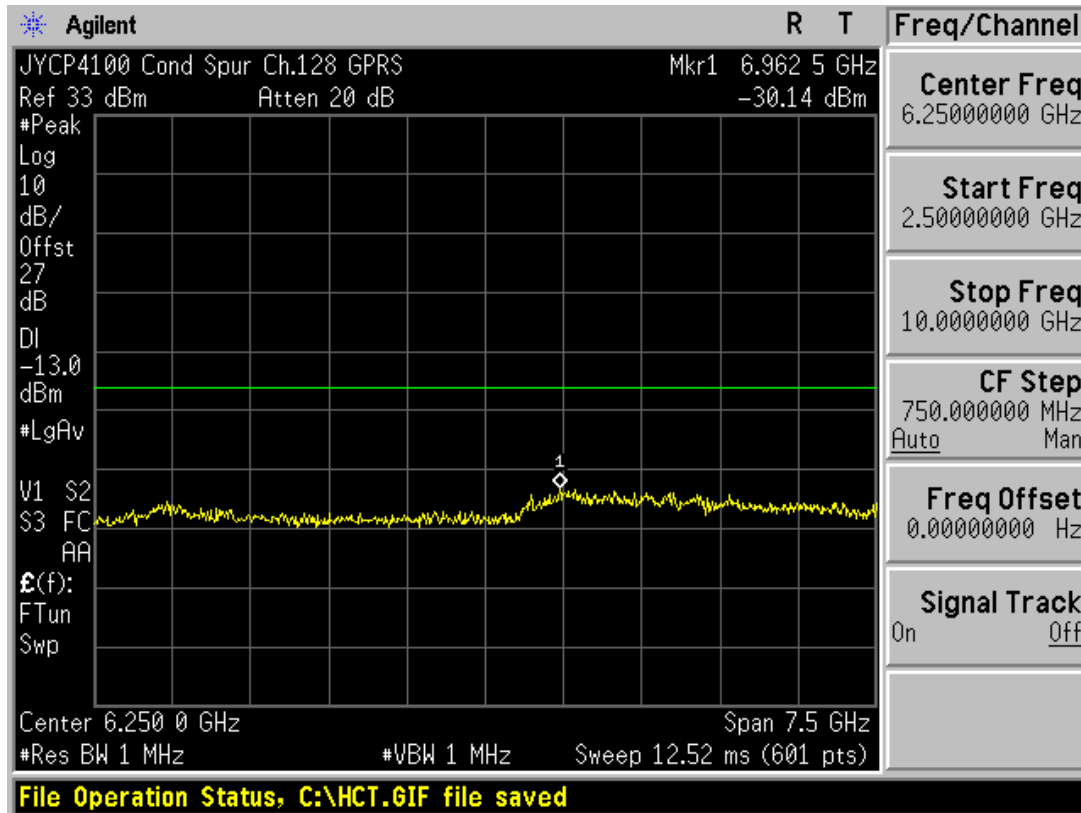


FCC CERTIFICATION REPORT

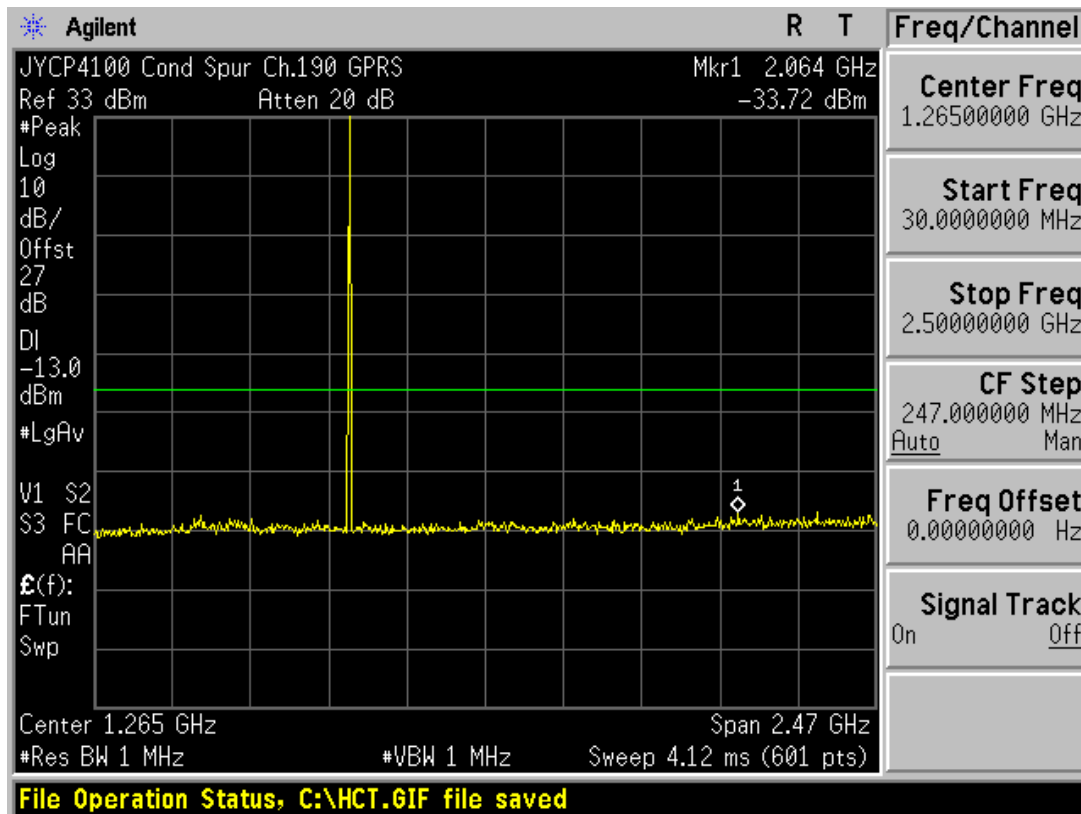
www.hct.co.kr

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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■ GSM850 MODE (128 CH.) Conducted Spurious Emissions2



■ GSM850 MODE (190 CH.) Conducted Spurious Emissions1

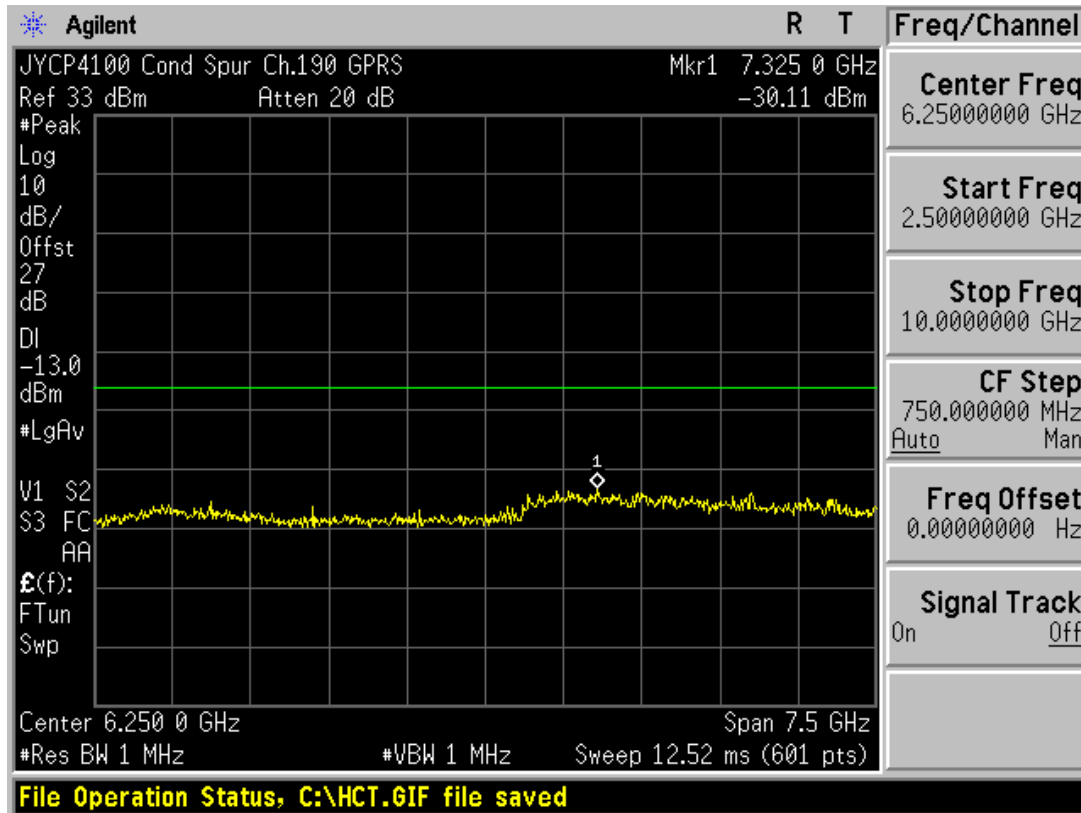


FCC CERTIFICATION REPORT

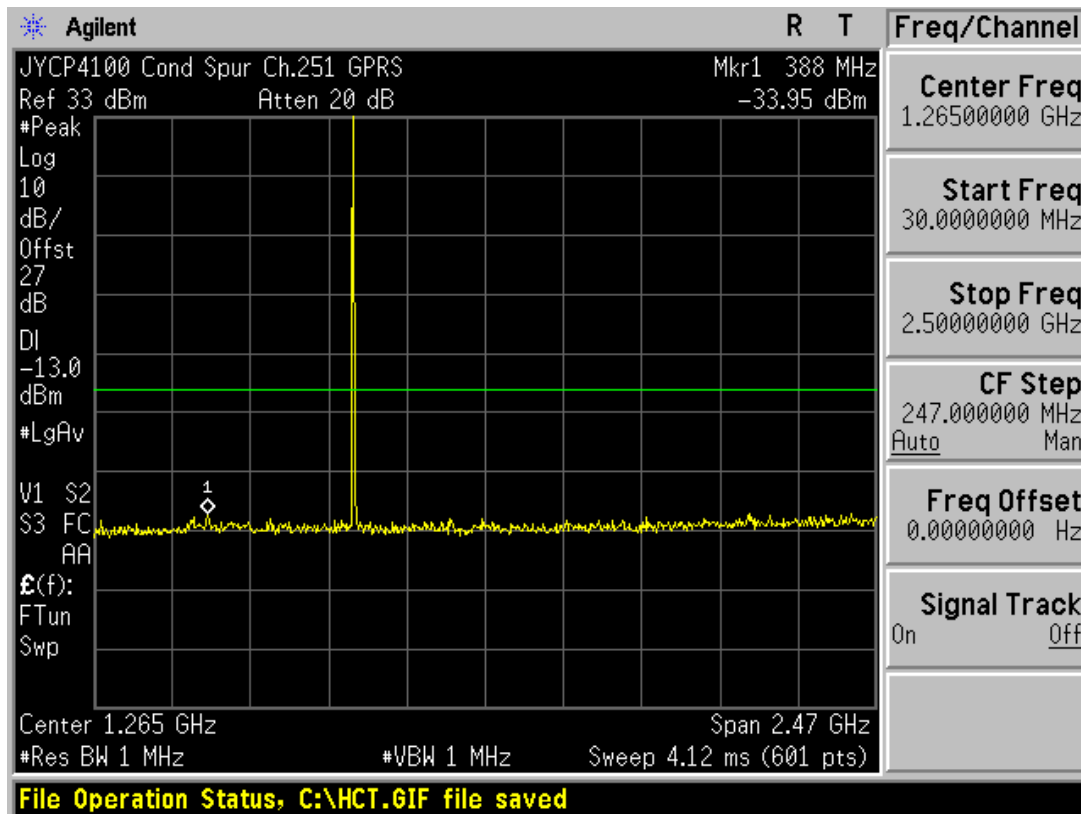
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Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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■ GSM850 MODE (190 CH.) Conducted Spurious Emissions2



■ GSM850 MODE (251 CH.) Conducted Spurious Emissions1

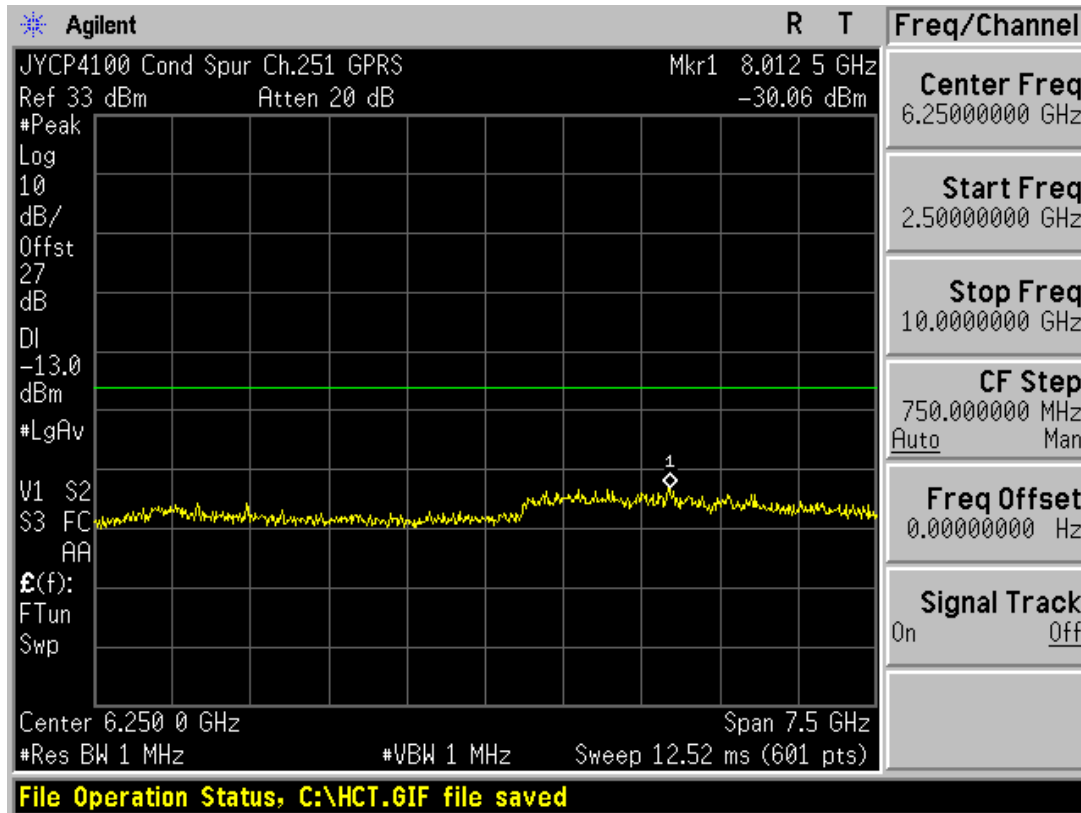


FCC CERTIFICATION REPORT

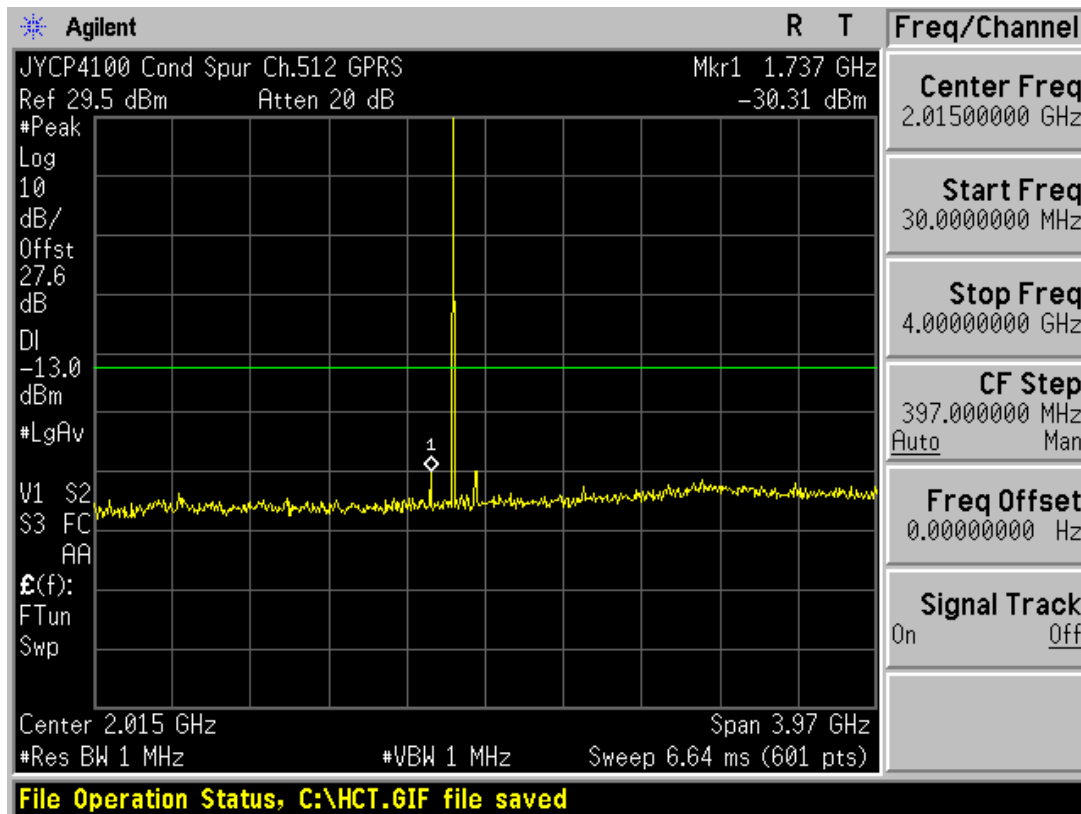
www.hct.co.kr

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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■ GSM850 MODE (251 CH.) Conducted Spurious Emissions2



■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions1

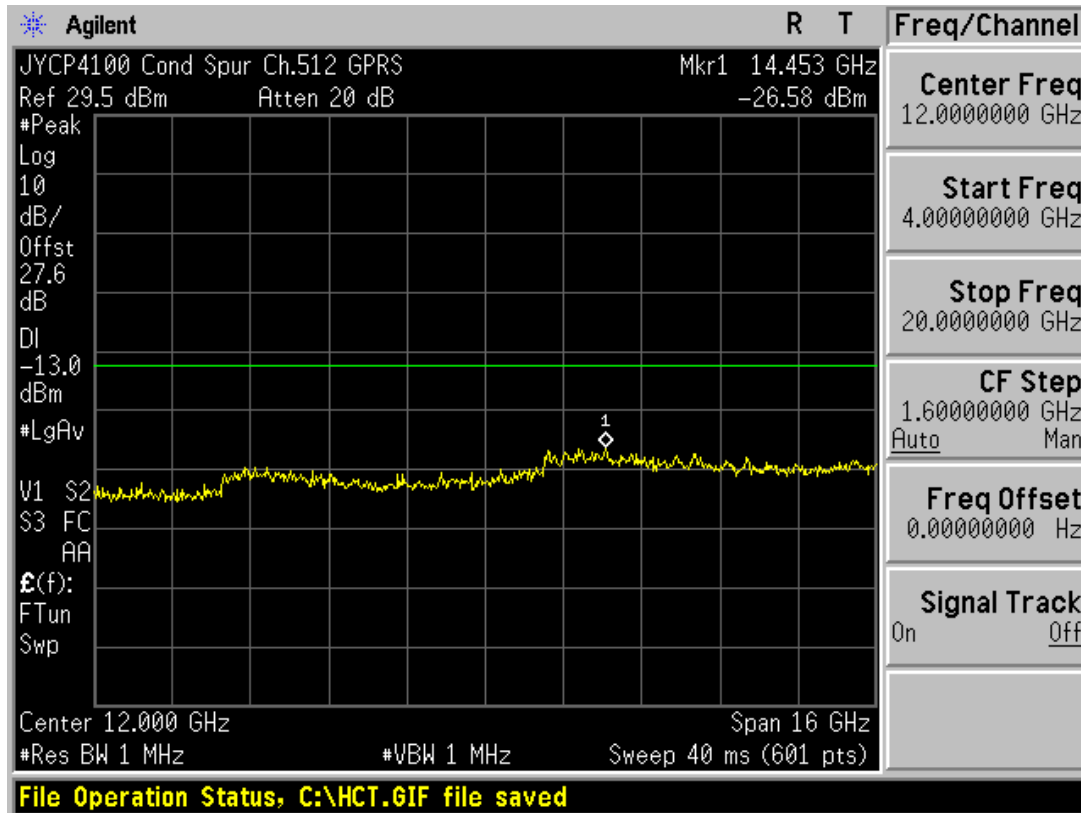


FCC CERTIFICATION REPORT

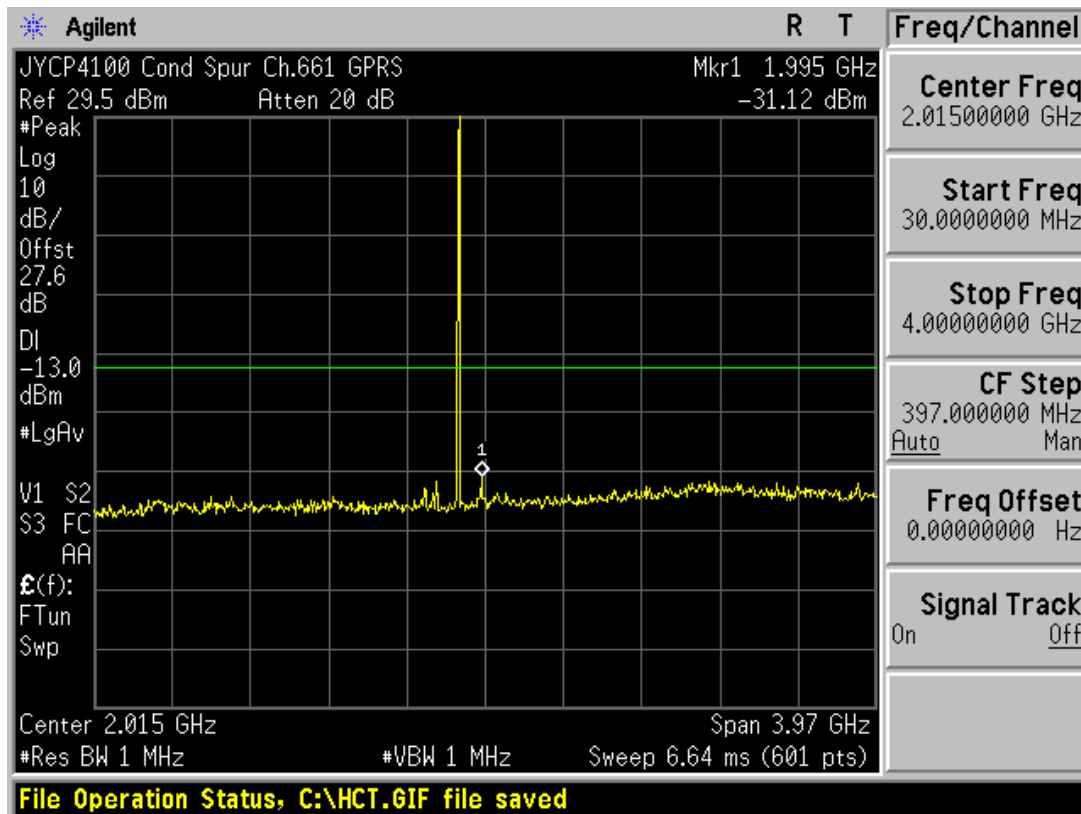
www.hct.co.kr

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions2



■ GSM1900 MODE (661 CH) Conducted Spurious Emissions1

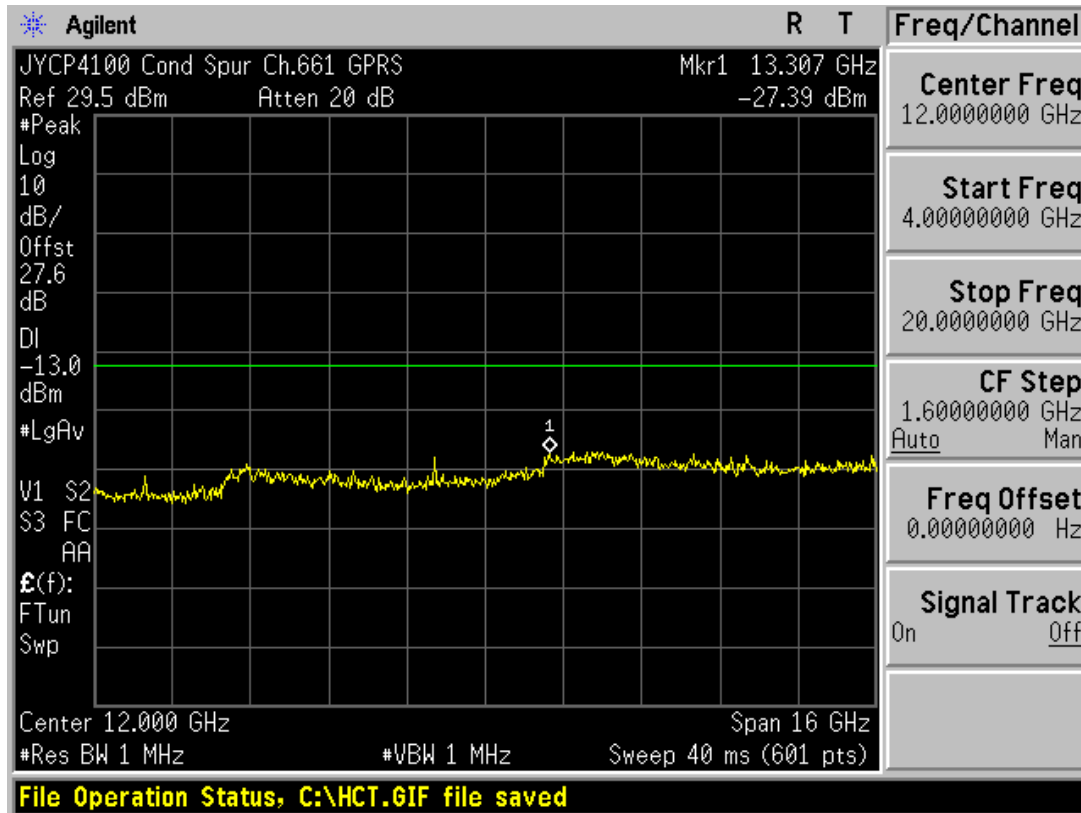


FCC CERTIFICATION REPORT

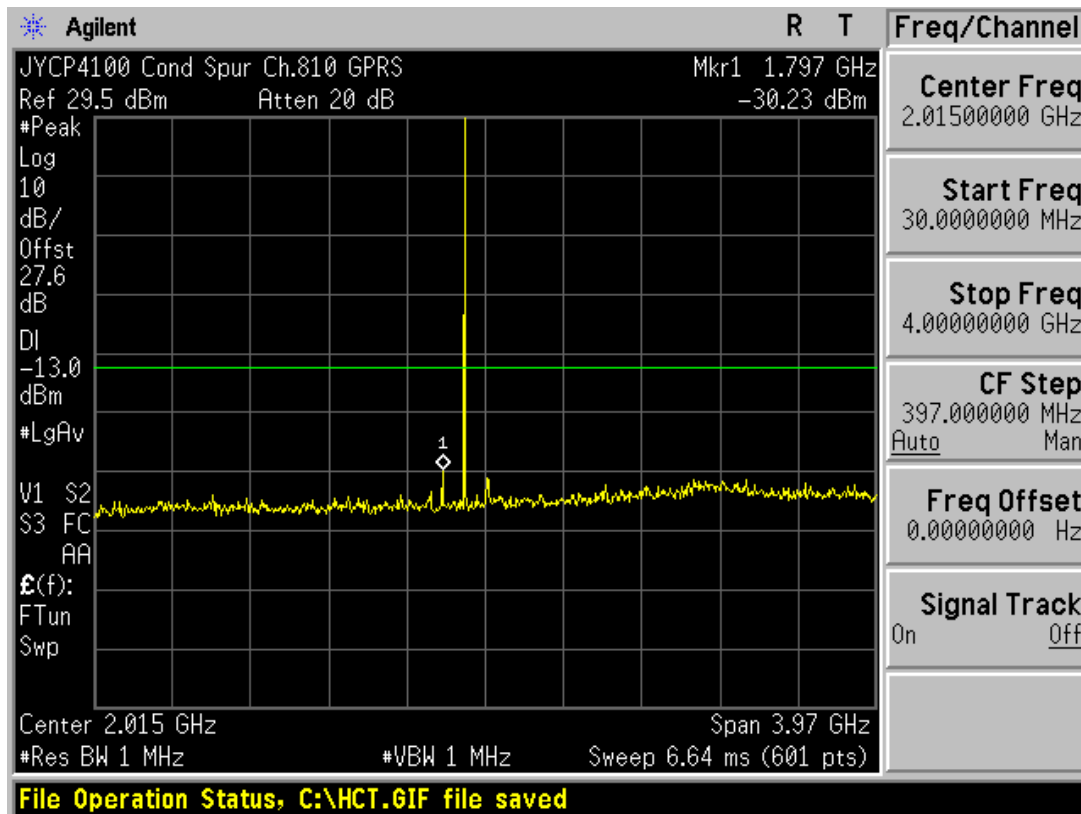
www.hct.co.kr

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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■ GSM1900 MODE (661 CH.) Conducted Spurious Emissions2



■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions1



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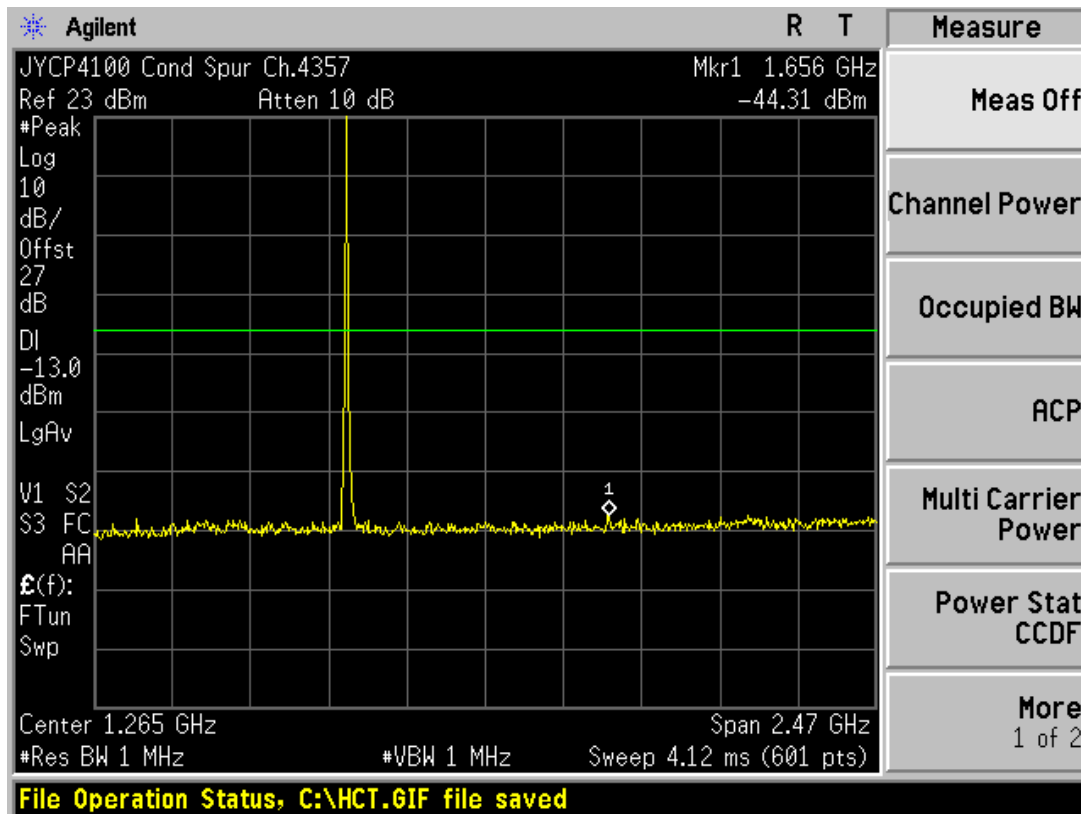
www.hct.co.kr

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	FCC ID: JYCP4100
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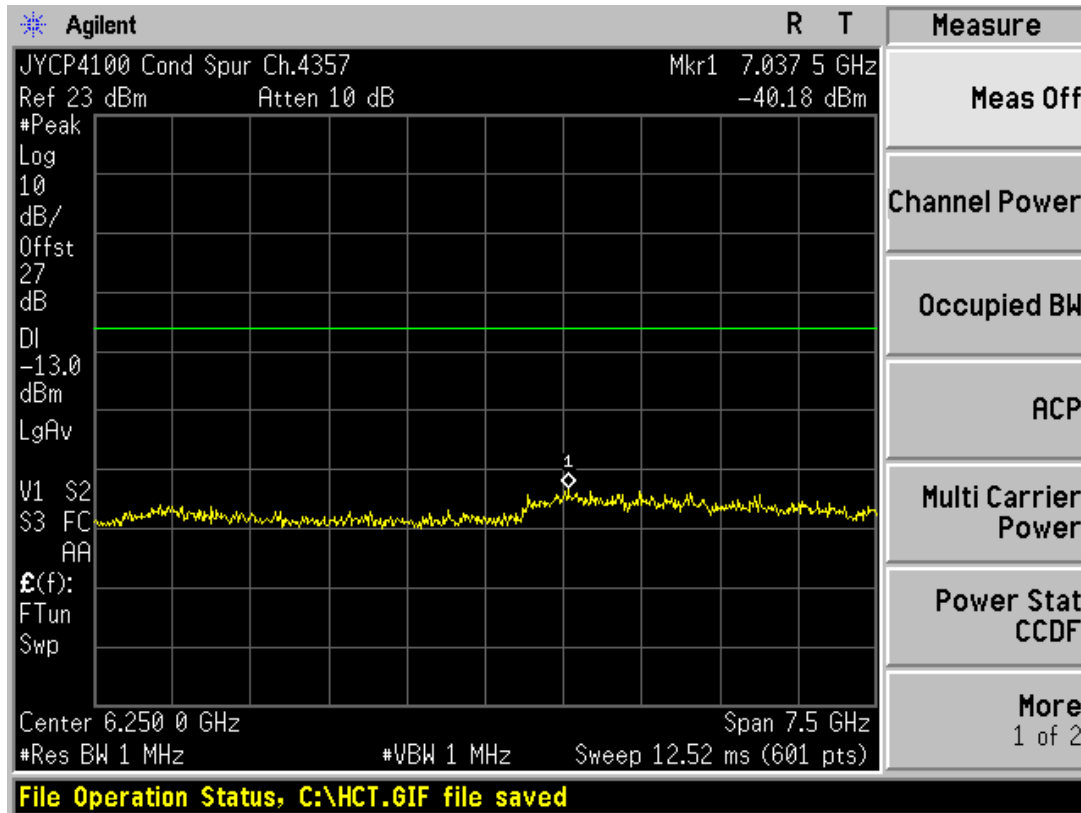
■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions2



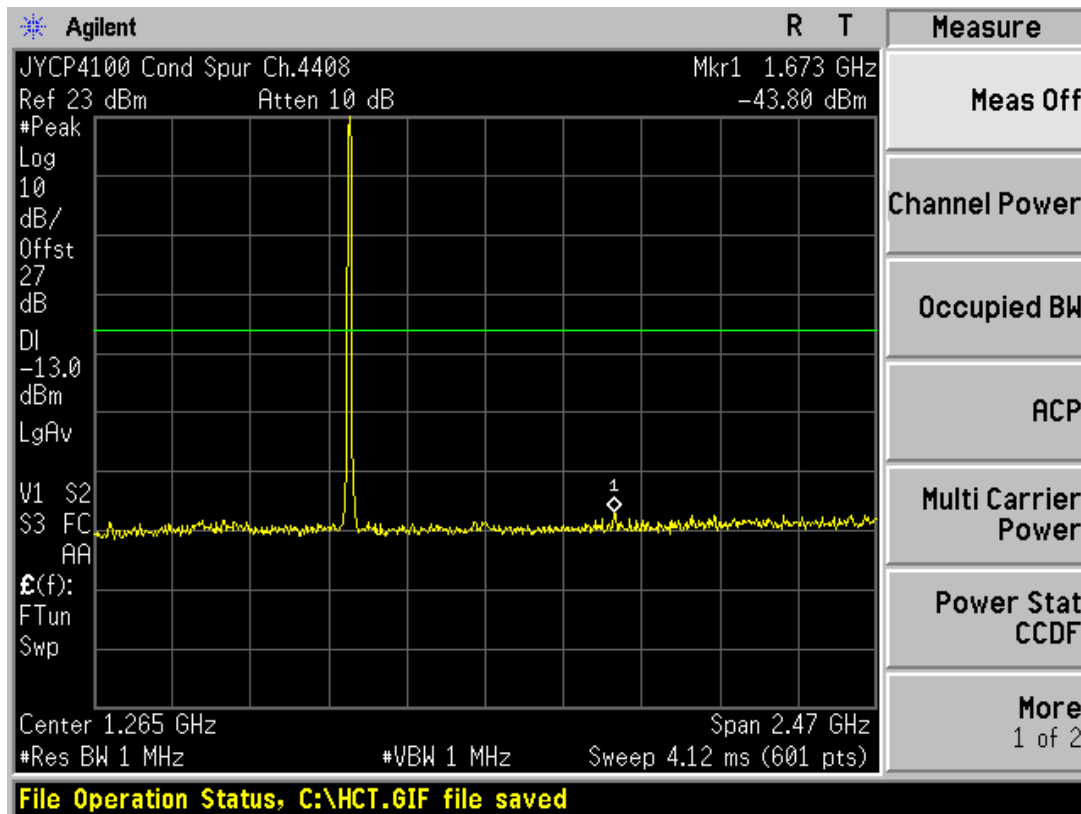
■ WCDMA850 MODE (4132 CH.) Conducted Spurious Emissions1



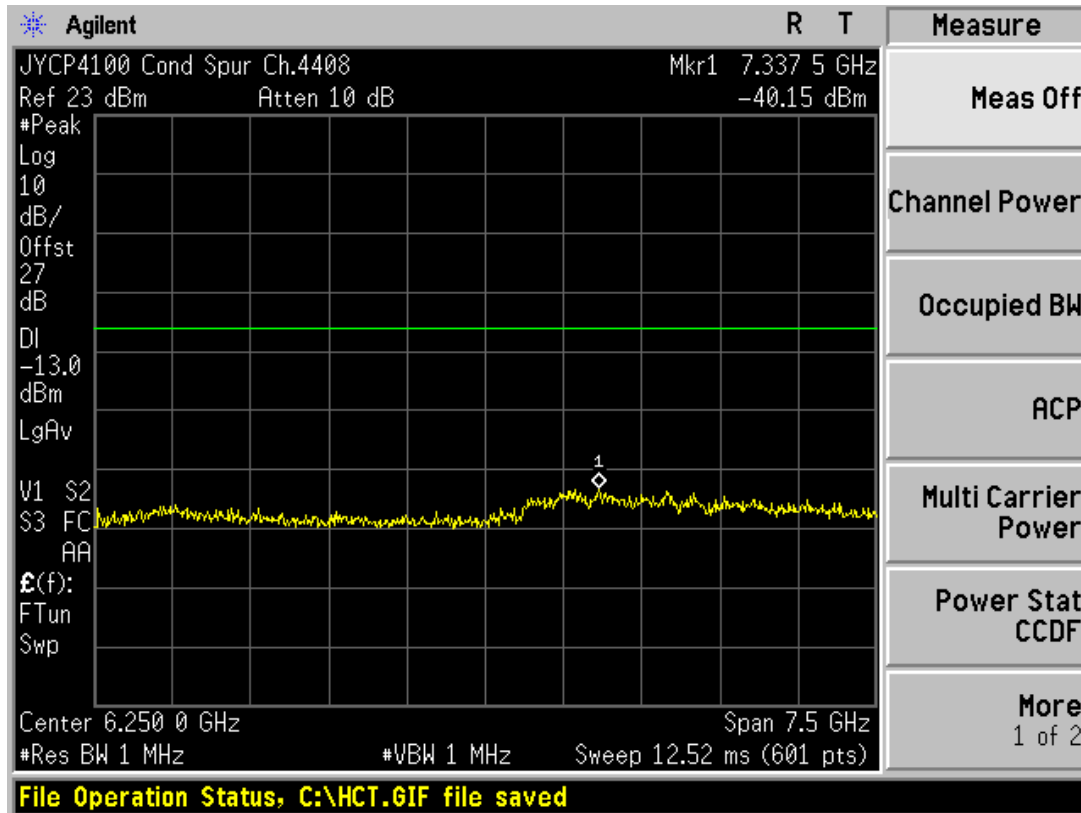
■ WCDMA850 MODE (4132 CH.) Conducted Spurious Emissions2



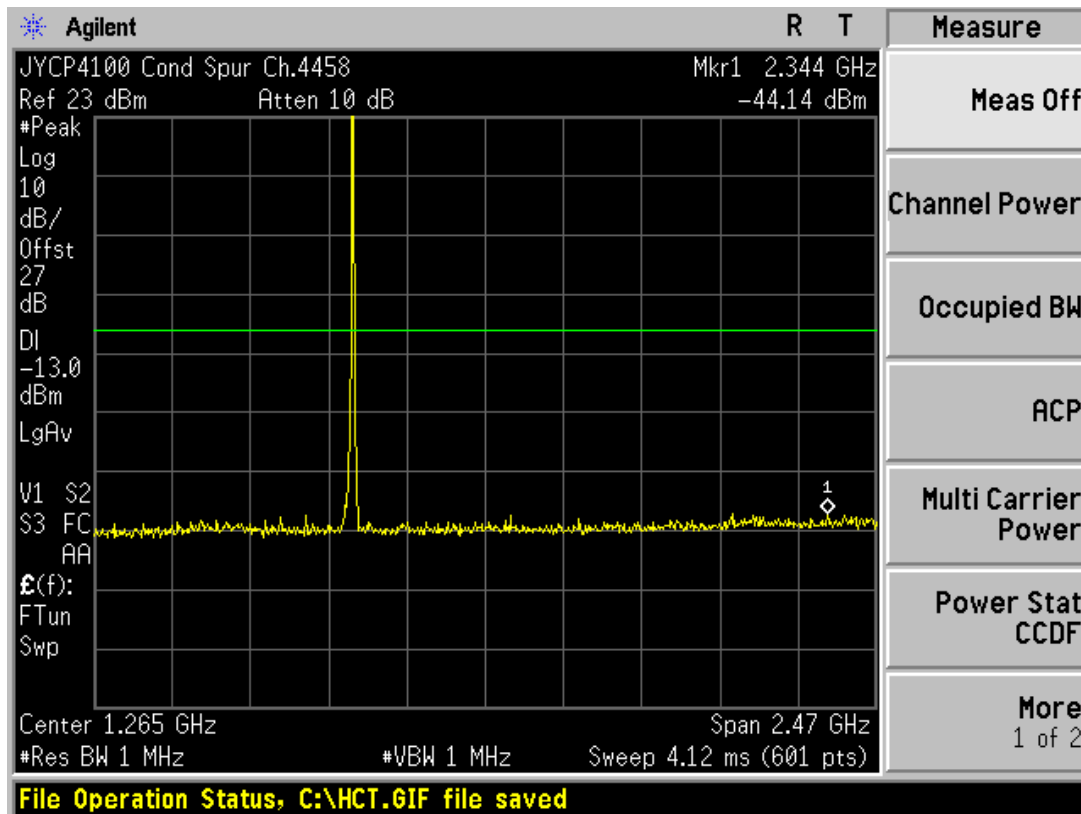
■ WCDMA850 MODE (4183 CH.) Conducted Spurious Emissions1



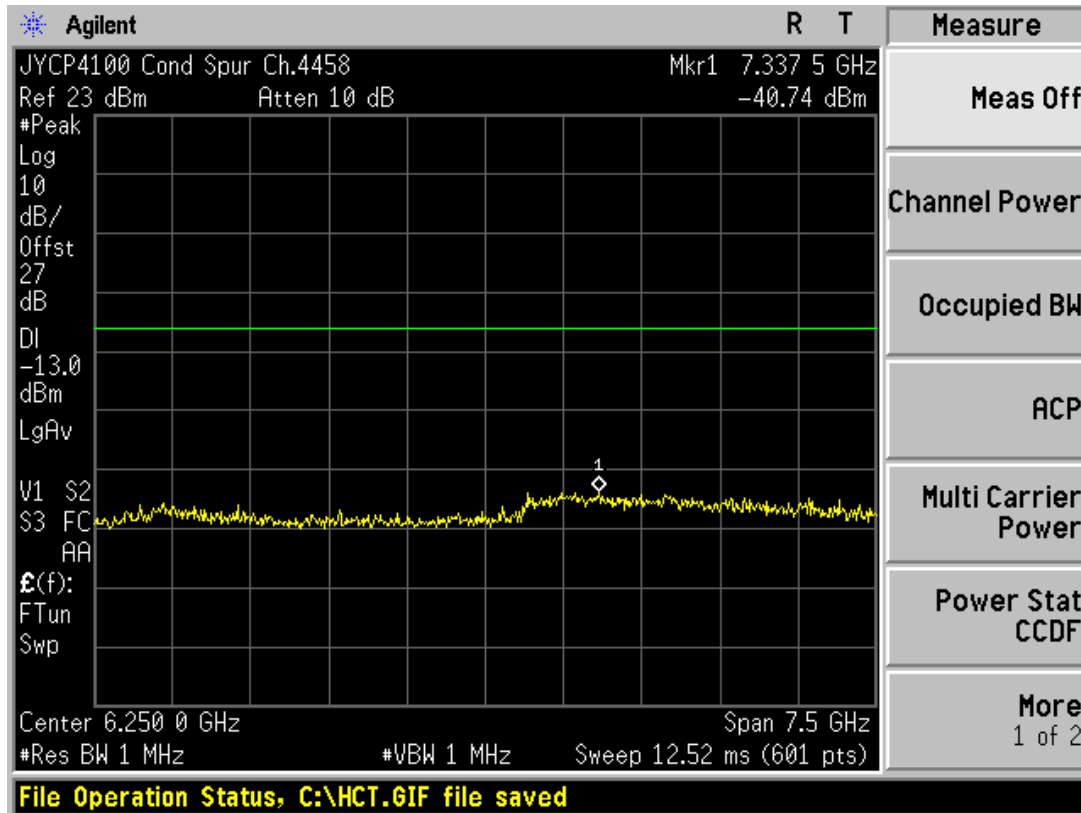
■ WCDMA850 MODE (4183 CH.) Conducted Spurious Emissions2



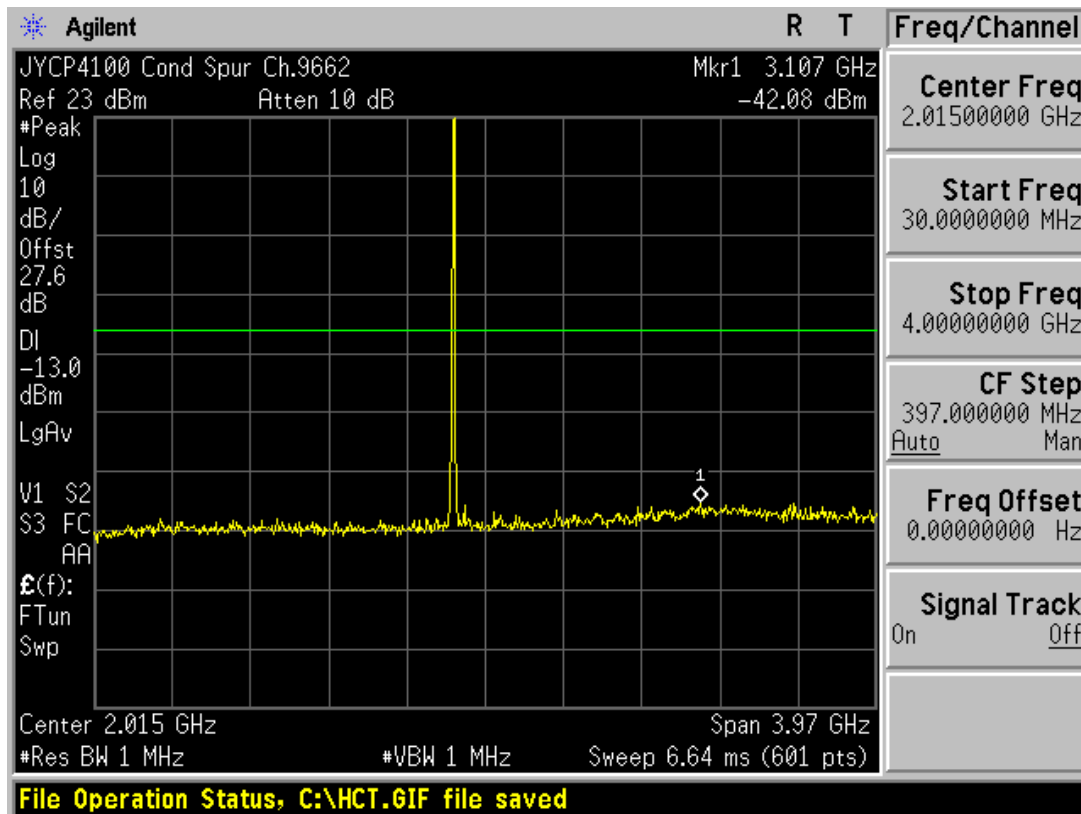
■ WCDMA850MODE (4233 CH.) Conducted Spurious Emissions1



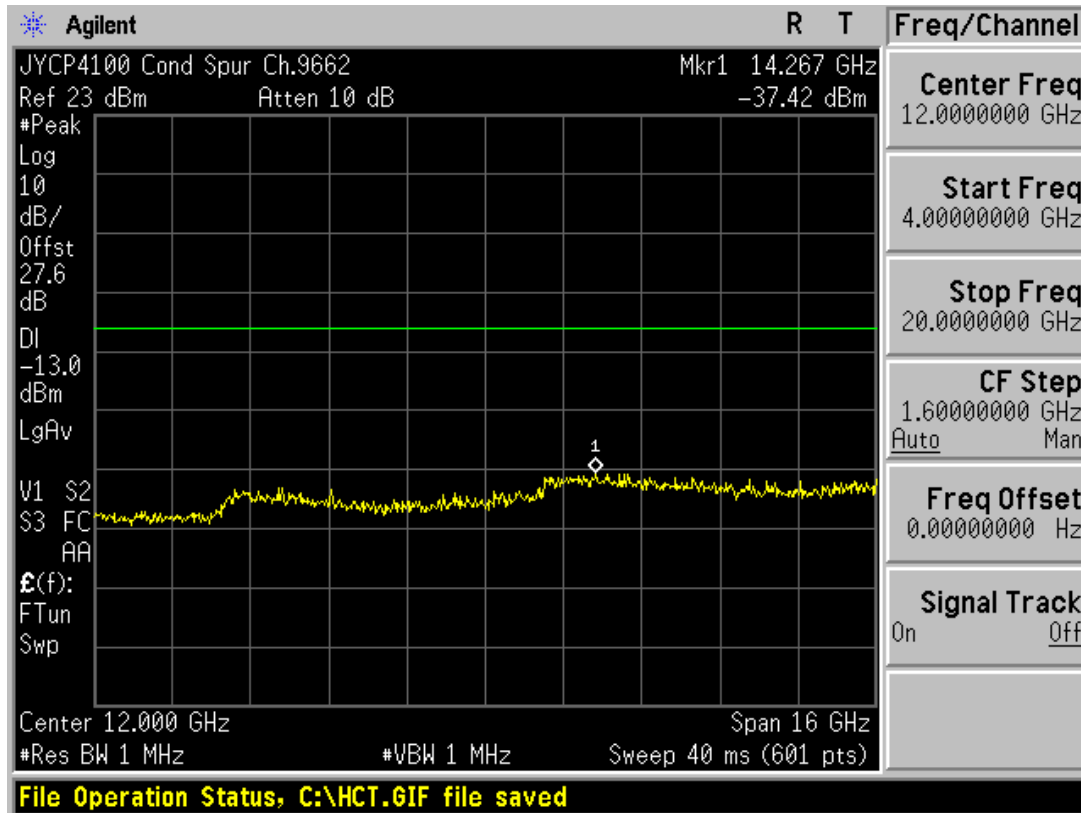
■ WCDMA850MODE (4233 CH.) Conducted Spurious Emissions2



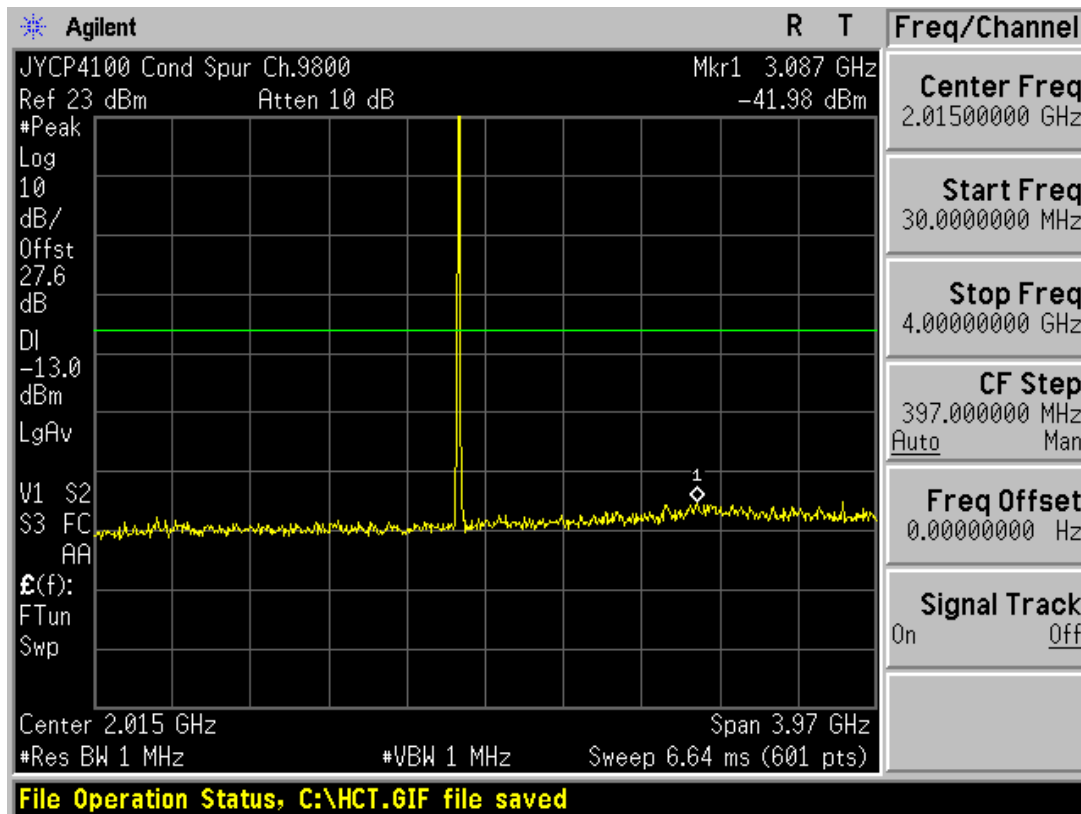
■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions1



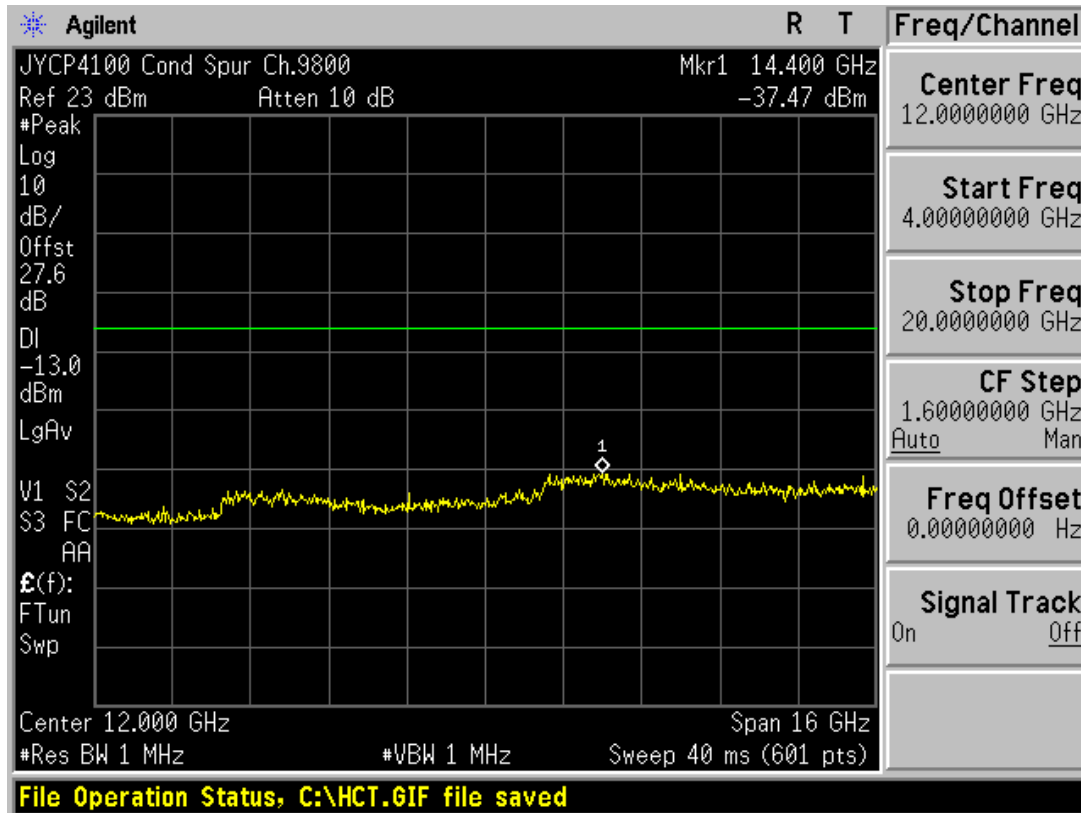
■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions2



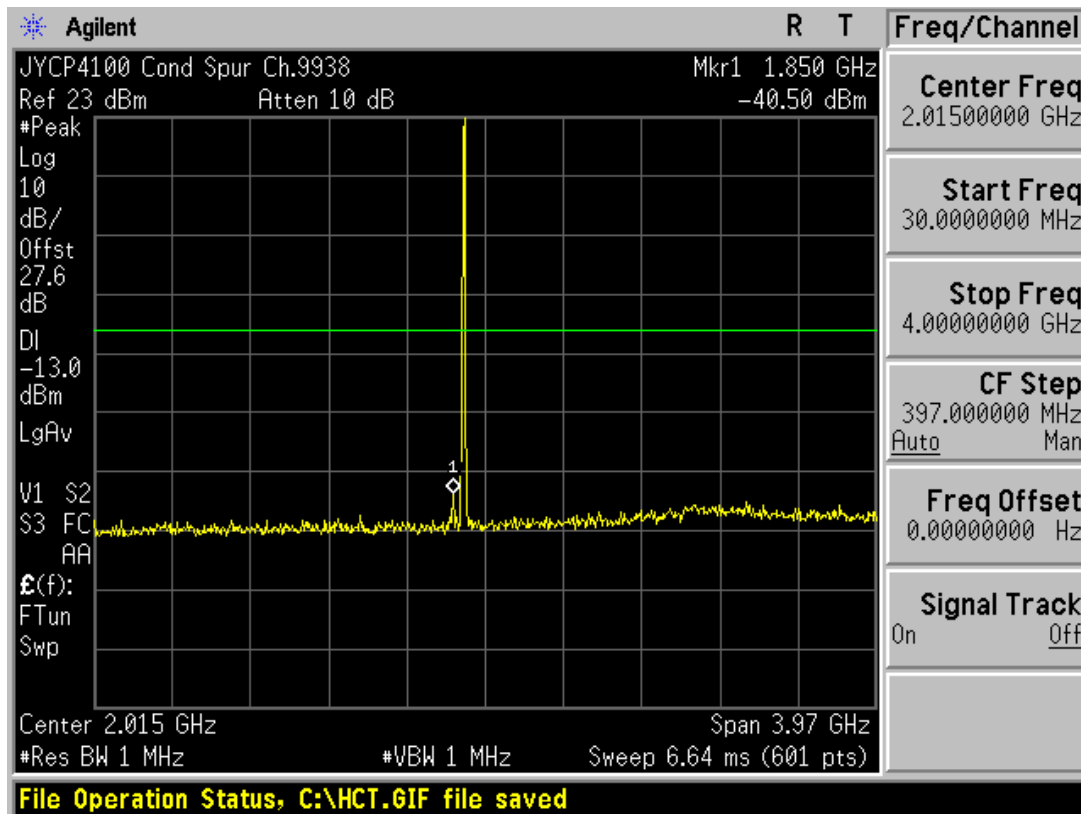
■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions1



■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions2



■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions1



FCC CERTIFICATION REPORT

Test Report No. HCTR1109FR05	Date of Issue: September 02, 2011	EUT Type: GSM/WCDMA/LTE Phone with Bluetooth / WLAN	www.hct.co.kr FCC ID: JYCP4100
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■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions2

