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:
July 19, 2012

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

Test Report No.: HCTR1207FR08

HCT FRN: 0005866421

FCC ID	**: JYCPREMIAV**
APPLICANT	**: Pantech Co., Ltd.**

FCC Model(s):	ADR930LVW	
EUT Type:	CDMA/GSM/LTE Phone with BT/WLAN/NFC	
FCC Classification:	Licensed Portable Transmitter Held to Ear (PCE)	
Tx Frequency:	824.20 - 848.80 MHz (GSM850) 1 850.20 - 1 909.80 MHz (GSM1900)	
Rx Frequency:	869.20 - 893.80 MHz (GSM850) 1 930.20 - 1 989.80 MHz (GSM1900)	
Max. RF Output Power:	Standard Cover:	0.723 W ERP GSM850 (28.59 dBm) / 0.313 W EIRP GSM1900 (24.95 dBm) 0.495 W ERP EDGE850 (26.95 dBm) / 0.471 W EIRP EDGE1900 (26.73 dBm)
	Extended Cover:	0.750 W ERP GSM850 (28.75 dBm) / 0.301 W EIRP GSM1900 (24.79 dBm) 0.472 W ERP EDGE850 (26.74 dBm) / 0.375 W EIRP EDGE1900 (25.74 dBm)
	Wireless Cover:	0.682 W ERP GSM850 (28.34 dBm) / 0.335 W EIRP GSM1900 (25.25 dBm) 0.495 W ERP EDGE850 (26.95 dBm) / 0.508 W EIRP EDGE1900 (27.06 dBm)
Emission Designator(s):	247KGXW (GSM850) 246KGXW (GSM1900) 245 KG7W (GSM850 EDGE) 241 KG7W (GSM1900 EDGE)	
FCC Rule Part(s):	§22, §24, §2	

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)

Hyo Sun Kwak

Report prepared by
: Hyo Sun Kwak
Test engineer of RF Team

Approved by
: Sang Jun Lee
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1207FR08	July 19, 2012	First Approval Report

Table of Contents

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:	JYCPREMIAV
Application Type:	Certification
FCC Classification:	Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22, §24, §2
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Tx Frequency:	824.20 - 848.80 MHz (GSM850) 1 850.20 - 1 909.80 MHz (GSM1900)
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Max. RF Output Power:	Standard Cover: 0.723 W ERP GSM850 (28.59 dBm) / 0.313 W EIRP GSM1900 (24.95 dBm) 0.495 W ERP EDGE850 (26.95 dBm) / 0.471 W EIRP EDGE1900 (26.73 dBm) Extended Cover: 0.750 W ERP GSM850 (28.75 dBm) / 0.301 W EIRP GSM1900 (24.79 dBm) 0.472 W ERP EDGE850 (26.74 dBm) / 0.375 W EIRP EDGE1900 (25.74 dBm) Wireless Cover: 0.682 W ERP GSM850 (28.34 dBm) / 0.335 W EIRP GSM1900 (25.25 dBm) 0.495 W ERP EDGE850 (26.95 dBm) / 0.508 W EIRP EDGE1900 (27.06 dBm)
Emission Designator(s):	247KGXW (GSM850) 246KGXW (GSM1900) 245 KG7W (GSM850 EDGE) 241 KG7W (GSM1900 EDGE)
Date(s) of Tests:	April 26, 2012 ~ May 11, 2012
Antenna Specification	Manufacturer: MicroRF Co, Ltd. Antenna type: INTERNAL Antenna Peak Gain: -0.357 dBi

2. INTRODUCTION

2.1. EUT DESCRIPTION

The Pantech Co., Ltd. ADR930LVW CDMA/GSM/LTE Phone with BT/WLAN/NFC consists of GSM850, GSM1900, GPRS10 and EDGE10.

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

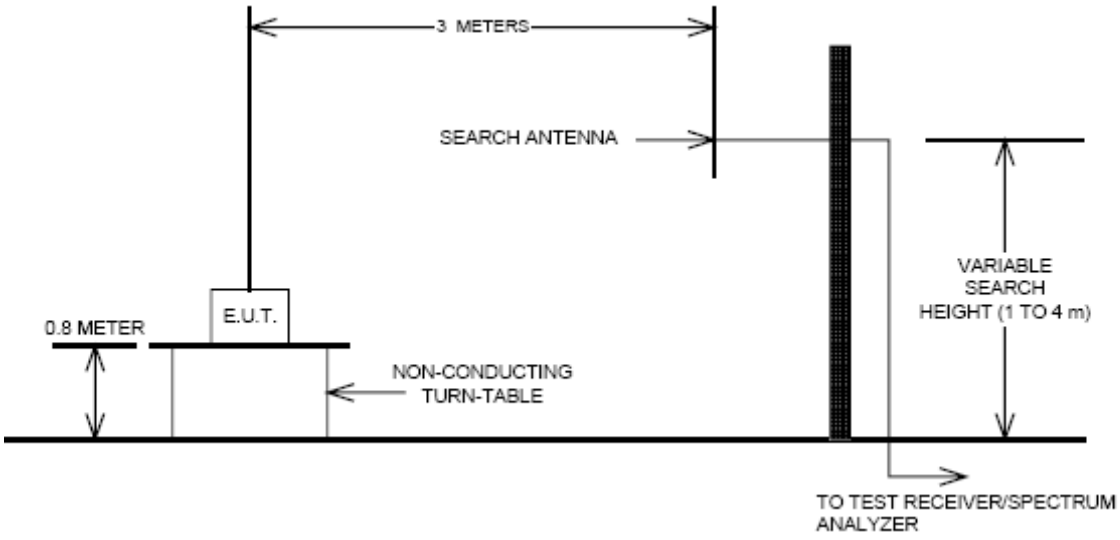
The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri , Majang-Myeon, Icheon-si, 467-811, KOREA.

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)

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 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.

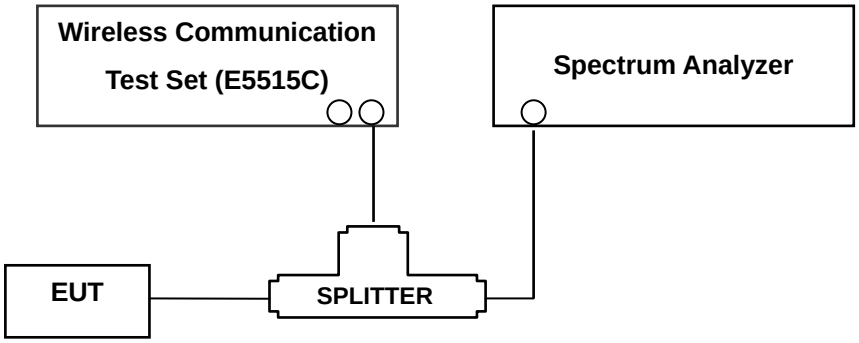
The maximum EIRP was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. For readings above 1GHz, the above procedure is repeated using horn antennas and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

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.

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

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.)

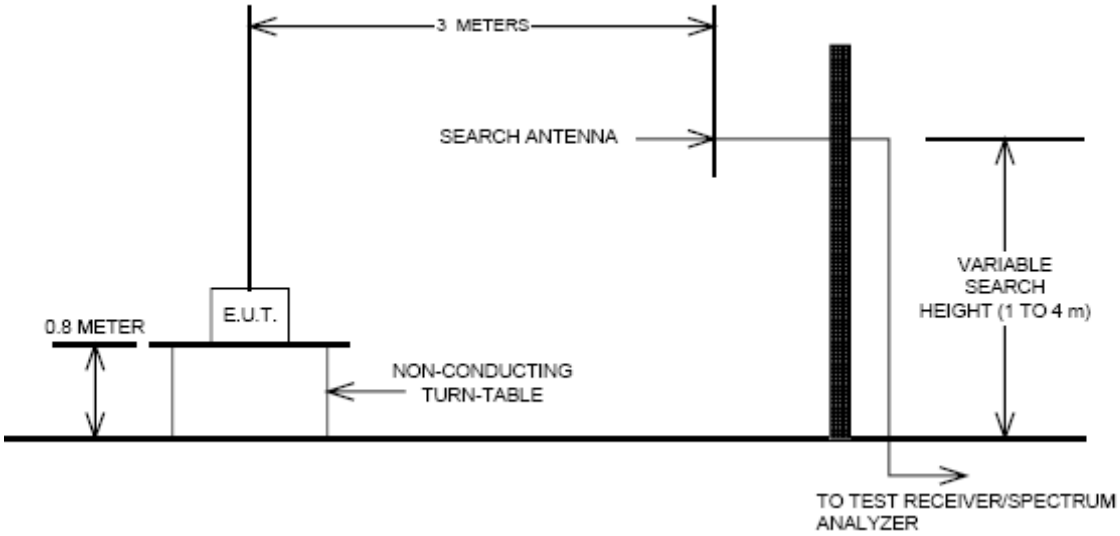
The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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)

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.

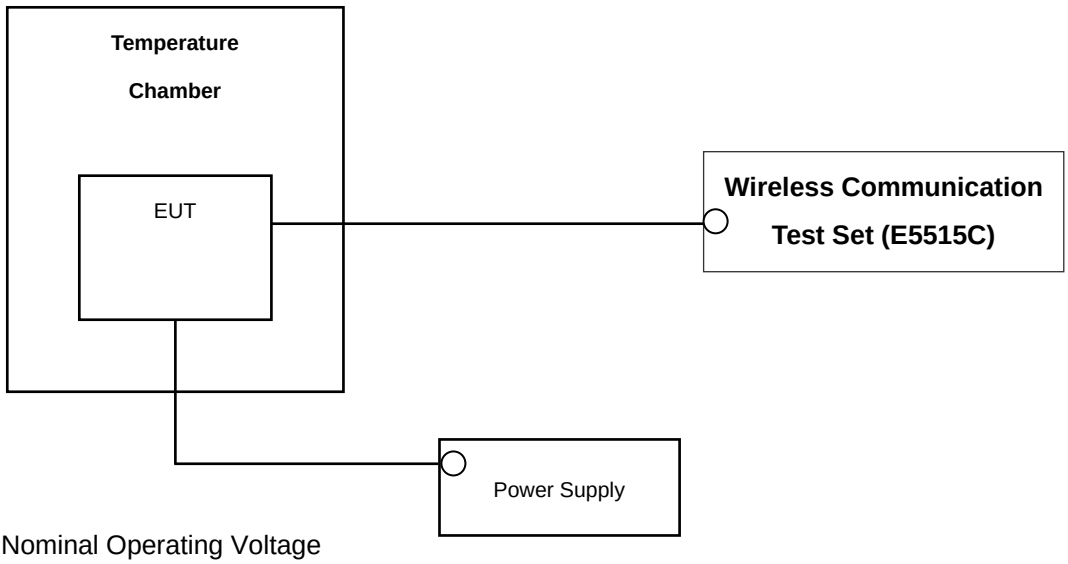
Test Procedure

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.

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 ± 0.000 25 %(± 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.

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

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 + 10log10 (P[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 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

6. SAMPLE CALCULATION

A. ERP Sample Calculation

Mode	Ch./ Freq.		Measured Level(dBm)	Substitude 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 = SubstitudeLEVEL(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

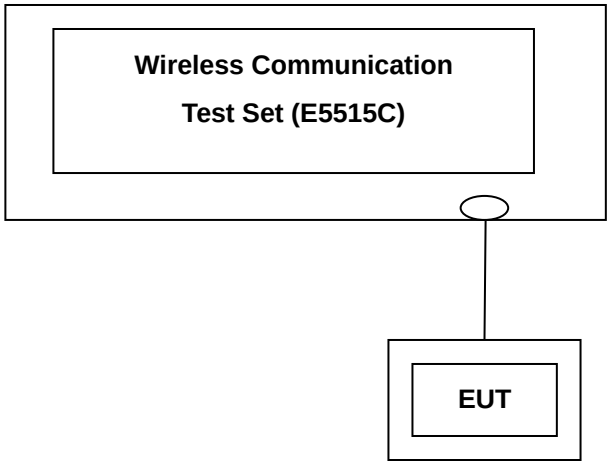
X = Cases not otherwise covered

W = Combination (Audio/Data)

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		EDGE Data	
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)
GSM 850	128	32.97	32.45	31.33	27.88	25.25
	190	32.50	32.59	31.41	27.89	25.13
	251	32.53	32.56	30.70	27.78	25.10
GSM 1900	512	29.40	29.42	28.30	26.01	24.62
	661	29.54	29.45	28.43	26.00	24.65
	810	29.56	29.57	28.28	26.05	24.50

(GSM Conducted Maximum 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.

7.3 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (kHz)
GSM850	128	824.20	247.4015
	190	836.60	245.5091
	251	848.80	245.8799
GSM850 EDGE	128	824.20	245.0101
GSM1900	512	1850.20	246.4240
	661	1880.00	244.9039
	810	1909.80	244.2042
GSM1900 EDGE	512	1850.20	240.7381

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

7.4 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Maximum Data (dBm)
GSM850	128	7.250	-31.54
	190	7.188	-31.62
	251	7.412	-31.71
GSM1900	512	14.130	-28.66
	661	14.670	-28.75
	810	14.990	-29.21

- Plots of the EUT's Conducted Spurious Emissions are shown Page 44 ~ 49.

7.4.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 36 ~ 43.

7.5 EFFECTIVE RADIATED POWER OUTPUT (GSM850)

(GSM850 Mode)_Standard Cover

Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	ERP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)			**W**	**dBm**
128	824.20	-8.19	40.74	-10.54	1.61	V	0.723	28.59
190	836.60	-9.19	39.73	-10.50	1.67	V	0.570	27.56
251	848.80	-10.24	38.82	-10.47	1.64	V	0.469	26.71
EDGE 128	824.20	-9.83	39.10	-10.54	1.61	V	0.495	26.95

(GSM850 Mode)_Extended Cover

Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	ERP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)			**W**	**dBm**
128	824.20	-8.03	40.90	-10.54	1.61	V	0.750	28.75
190	836.60	-9.50	39.42	-10.50	1.67	V	0.531	27.25
251	848.80	-10.87	38.19	-10.47	1.64	V	0.406	26.08
EDGE 128	824.20	-10.04	38.89	-10.54	1.61	V	0.472	26.74

(GSM850 Mode)_Wireless Cover

Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	ERP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)			**W**	**dBm**
128	824.20	-8.44	40.49	-10.54	1.61	V	0.682	28.34
190	836.60	-9.37	39.55	-10.50	1.67	V	0.547	27.38
251	848.80	-10.71	38.35	-10.47	1.64	V	0.421	26.24
EDGE 128	824.20	-9.83	39.10	-10.54	1.61	V	0.495	26.95

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 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 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 in y plane in GSM850 mode. Also worst case of detecting Antenna is in vertical polarization in GSM850 mode.

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

7.6 EQUIVALENT ISOTROPIC RADIATED POWER (GSM1900)

(GSM1900 Mode) _Standard Cover

Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)			**W**	**dBm**
512	1,850.20	-15.16	16.64	10.02	1.71	H	0.313	24.95
661	1,880.00	-16.00	15.98	10.04	1.77	H	0.266	24.25
810	1,909.80	-16.21	16.05	10.05	1.80	H	0.269	24.30
EDGE 512	1,850.20	-13.38	18.42	10.02	1.71	H	0.471	26.73

(GSM1900 Mode) _Extended Cover

Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)			**W**	**dBm**
512	1,850.20	-15.32	16.48	10.02	1.71	H	0.301	24.79
661	1,880.00	-16.58	15.40	10.04	1.77	H	0.233	23.67
810	1,909.80	-16.89	15.37	10.05	1.80	H	0.230	23.62
EDGE 512	1,850.20	-14.37	17.43	10.02	1.71	H	0.375	25.74

(GSM1900 Mode) _Wireless Cover

Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)			**W**	**dBm**
512	1,850.20	-14.86	16.94	10.02	1.71	H	0.335	25.25
661	1,880.00	-16.07	15.91	10.04	1.77	H	0.262	24.18
810	1,909.80	-16.11	16.15	10.05	1.80	H	0.275	24.40
EDGE 512	1,850.20	-13.05	18.75	10.02	1.71	H	0.508	27.06

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 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 in x plane in GSM1900 mode. Also worst case of detecting Antenna is in horizontal polarization in GSM1900 mode.

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

7.7 RADIATED SPURIOUS EMISSIONS

7.7.1 RADIATED SPURIOUS EMISSIONS (GSM850)

▣ MEASURED OUTPUT POWER: 28.59 dBm = 0.723 W

▣ MODULATION SIGNAL: GSM850_Standard Cover

▣ DISTANCE: 3 meters

▣ LIMIT: - (43 + 10 $\log_{10}$ (W)) = - 41.59 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	-41.45	9.66	-46.08	2.63	H	-39.05	-67.64
	2,472.60	-43.92	10.79	-46.76	3.55	H	-39.52	-68.11
	3,296.80	-32.52	11.76	-35.89	4.79	V	-28.92	-57.51
190 (836.6)	1,673.20	-42.22	9.77	-46.92	2.67	H	-39.82	-68.41
	2,509.80	-43.96	10.82	-47.07	3.61	H	-39.86	-68.45
	3,346.40	-32.49	11.87	-36.72	4.94	V	-29.79	-58.38
251 (848.8)	1,697.60	-41.42	9.94	-46.55	2.61	H	-39.22	-67.81
	2,546.40	-43.95	10.84	-47.59	3.60	V	-40.35	-68.94
	3,395.20	-33.52	11.98	-38.59	4.11	V	-30.72	-59.31

▣ MEASURED OUTPUT POWER: 28.75 dBm = 0.750 W

▣ MODULATION SIGNAL: GSM850_Extended Cover

▣ DISTANCE: 3 meters

▣ LIMIT: - (43 + 10 $\log_{10}$ (W)) = - 41.75 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	-41.45	9.66	-46.08	2.63	H	-39.05	-67.80
	2,472.60	-41.59	10.79	-44.43	3.55	V	-37.19	-65.94
	3,296.80	-33.97	11.76	-37.34	4.79	V	-30.37	-59.12
190 (836.6)	1,673.20	-41.85	9.77	-46.55	2.67	H	-39.45	-68.20
	2,509.80	-44.01	10.82	-47.12	3.61	H	-39.91	-68.66
	3,346.40	-33.36	11.87	-37.59	4.94	V	-30.66	-59.41
251 (848.8)	1,697.60	-47.67	9.94	-52.80	2.61	V	-45.47	-74.22
	2,546.40	-44.69	10.84	-48.33	3.60	H	-41.09	-69.84
	3,395.20	-34.21	11.98	-39.28	4.11	V	-31.41	-60.16

▣ MEASURED OUTPUT POWER: 28.34 dBm = 0.682 W

▣ MODULATION SIGNAL: GSM850_Wireless Cover

▣ DISTANCE: 3 meters

▣ LIMIT: - (43 + 10 $\log_{10}$ (W)) = - 41.34 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	-40.61	9.66	-45.24	2.63	H	-38.21	-66.55
	2,472.60	-42.90	10.79	-45.74	3.55	H	-38.50	-66.84
	3,296.80	-37.26	11.76	-40.63	4.79	H	-33.66	-62.00
190 (836.6)	1,673.20	-42.48	9.77	-47.18	2.67	H	-40.08	-68.42
	2,509.80	-45.50	10.82	-48.61	3.61	V	-41.40	-69.74
	3,346.40	-35.03	11.87	-39.26	4.94	V	-32.33	-60.67
251 (848.8)	1,697.60	-46.35	9.94	-51.48	2.61	V	-44.15	-72.49
	2,546.40	-46.74	10.84	-50.38	3.60	H	-43.14	-71.48
	3,395.20	-35.72	11.98	-40.79	4.11	V	-32.92	-61.26

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.

7.7.2 RADIATED SPURIOUS EMISSIONS (GSM1900)

▣ MEASURED OUTPUT POWER: 26.73 dBm = 0.471 W

▣ MODULATION SIGNAL: GSM1900 EDGE_Standard Cover

▣ DISTANCE: 3 meters

▣ LIMIT: - (43 + 10 lo_{g10} (W)) = - 39.73 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	-36.83	12.36	-38.62	4.87	H	-31.13	-57.86
	5,550.60	-44.44	12.61	-40.89	6.66	H	-34.94	-61.67
	7,400.80	-47.89	10.97	-36.66	6.60	V	-32.29	-59.02
661 (1880.0)	3,760.00	-35.37	12.40	-37.09	4.88	H	-29.57	-56.30
	5,640.00	-45.86	12.65	-42.07	6.54	H	-35.96	-62.69
	7,520.00	-47.10	10.84	-34.72	7.32	H	-31.20	-57.93
810 (1909.8)	3,819.60	-35.59	12.45	-37.82	5.02	H	-30.39	-57.12
	5,729.40	-48.00	12.71	-44.47	6.54	H	-38.30	-65.03
	7,639.20	-46.75	10.87	-33.84	7.78	H	-30.75	-57.48

MEASURED OUTPUT POWER: 25.74 dBm = 0.375 W

▣ MODULATION SIGNAL: GSM1900 EDGE Extended Cover

▣ DISTANCE: 3 meters

▣ LIMIT: - (43 + 10 $\log_{10}$ (W)) = - 38.74 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	-36.67	12.36	-38.46	4.87	H	-30.97	-56.71
	5,550.60	-44.73	12.61	-41.18	6.66	H	-35.23	-60.97
	7,400.80	-47.75	10.97	-36.52	6.60	H	-32.15	-57.89
661 (1880.0)	3,760.00	-35.02	12.40	-36.74	4.88	H	-29.22	-54.96
	5,640.00	-45.40	12.65	-41.61	6.54	H	-35.50	-61.24
	7,520.00	-46.48	10.84	-34.10	7.32	H	-30.58	-56.32
810 (1909.8)	3,819.60	-35.51	12.45	-37.74	5.02	H	-30.31	-56.05
	5,729.40	-45.30	12.71	-41.77	6.54	H	-35.60	-61.34
	7,639.20	-46.33	10.87	-33.42	7.78	H	-30.33	-56.07

MEASURED OUTPUT POWER: 27.06 dBm = 0.508 W

▣ MODULATION SIGNAL: GSM1900 EDGE Wireless Cover

▣ DISTANCE: 3 meters

▣ LIMIT: - (43 + 10 $\log_{10}$ (W)) = - 40.06 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	-33.62	12.36	-35.41	4.87	H	-27.92	-54.98
	5,550.60	-46.27	12.61	-42.72	6.66	H	-36.77	-63.83
	7,400.80	-51.84	10.97	-40.61	6.60	V	-36.24	-63.30
661 (1880.0)	3,760.00	-33.02	12.40	-34.74	4.88	H	-27.22	-54.28
	5,640.00	-46.50	12.65	-42.71	6.54	H	-36.60	-63.66
	7,520.00	-50.46	10.84	-38.08	7.32	V	-34.56	-61.62
810 (1909.8)	3,819.60	-34.36	12.45	-36.59	5.02	H	-29.16	-56.22
	5,729.40	-45.29	12.71	-41.76	6.54	H	-35.59	-62.65
	7,639.20	-48.98	10.87	-36.07	7.78	V	-32.98	-60.04

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)

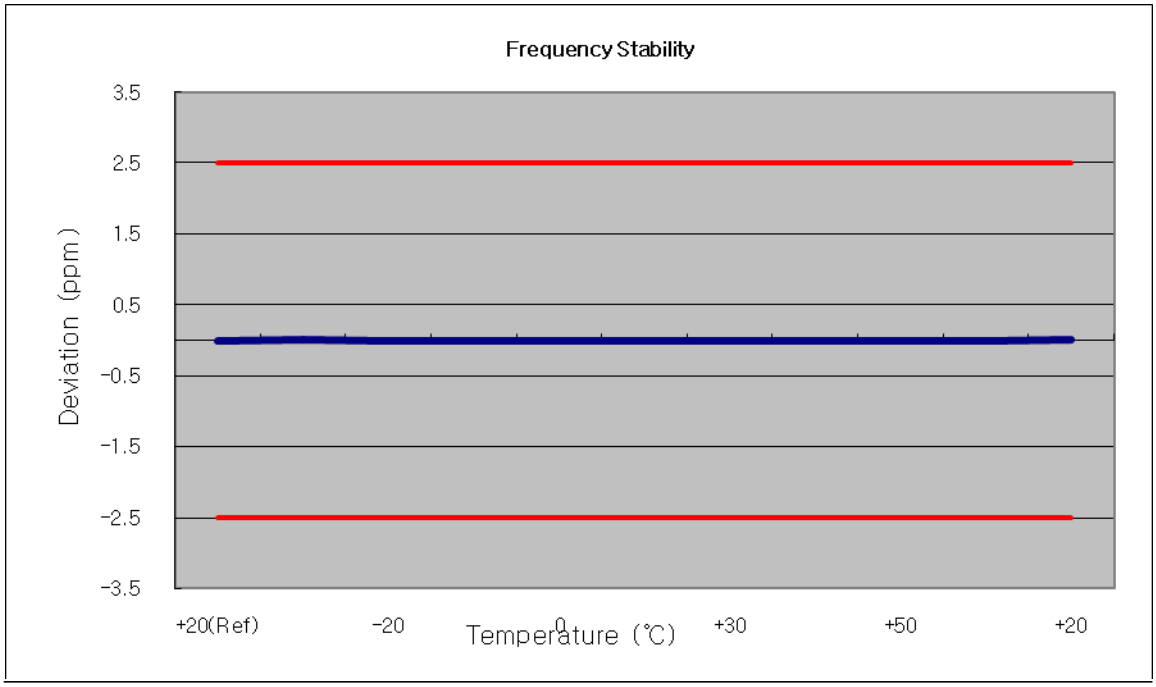
OPERATING FREQUENCY: 836,600,000 Hz

CHANNEL: 190

REFERENCE VOLTAGE: 3.7 VDC

DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	836 599 991	0	0.000 000	0.000
100%		−30	836 599 996	4.86	0.000 001	0.006
100%		−20	836 599 987	−4.51	−0.000 001	−0.005
100%		−10	836 599 986	−5.25	−0.000 001	−0.006
100%		0	836 599 984	−7.38	−0.000 001	−0.009
100%		+10	836 599 984	−7.75	−0.000 001	−0.009
100%		+30	836 599 986	−5.64	−0.000 001	−0.007
100%		+40	836 599 987	−4.50	−0.000 001	−0.005
100%		+50	836 599 986	−5.56	−0.000 001	−0.007
115%	4.255	+20	836 599 985	−6.38	−0.000 001	−0.008
Batt. Endpoint	3.400	+20	836 599 996	4.62	0.000 001	0.006



7.8.2 FREQUENCY STABILITY (GSM1900)

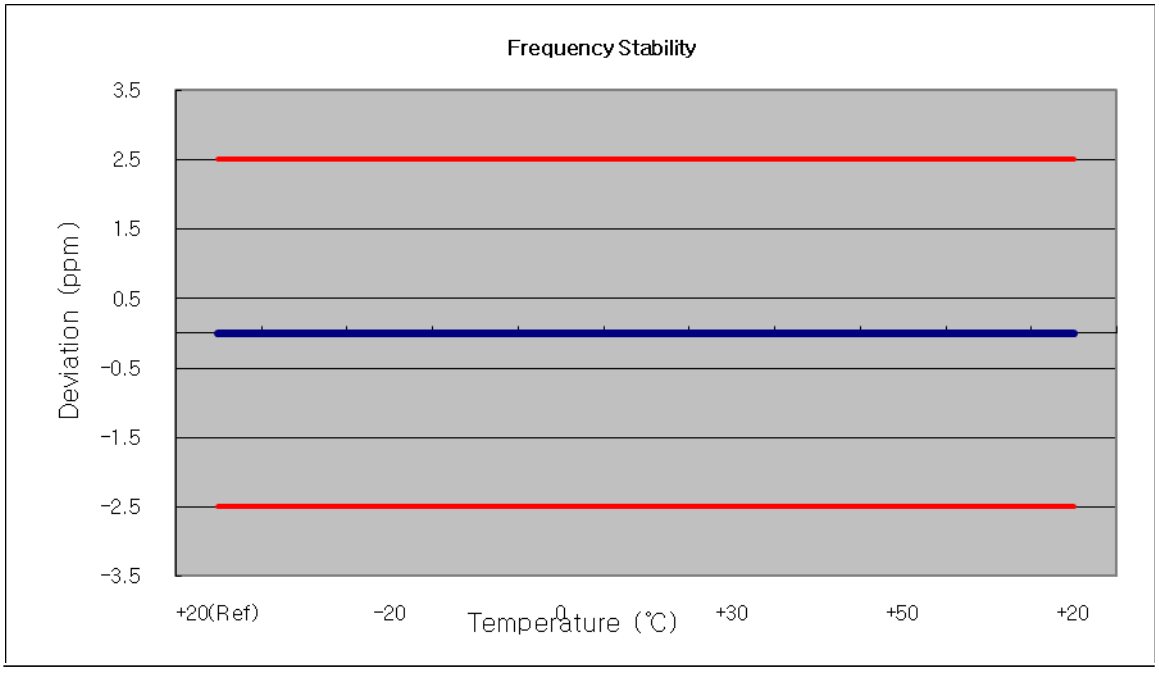
OPERATING FREQUENCY: 1880,000,000 Hz

CHANNEL: 661

REFERENCE VOLTAGE: 3.7 VDC

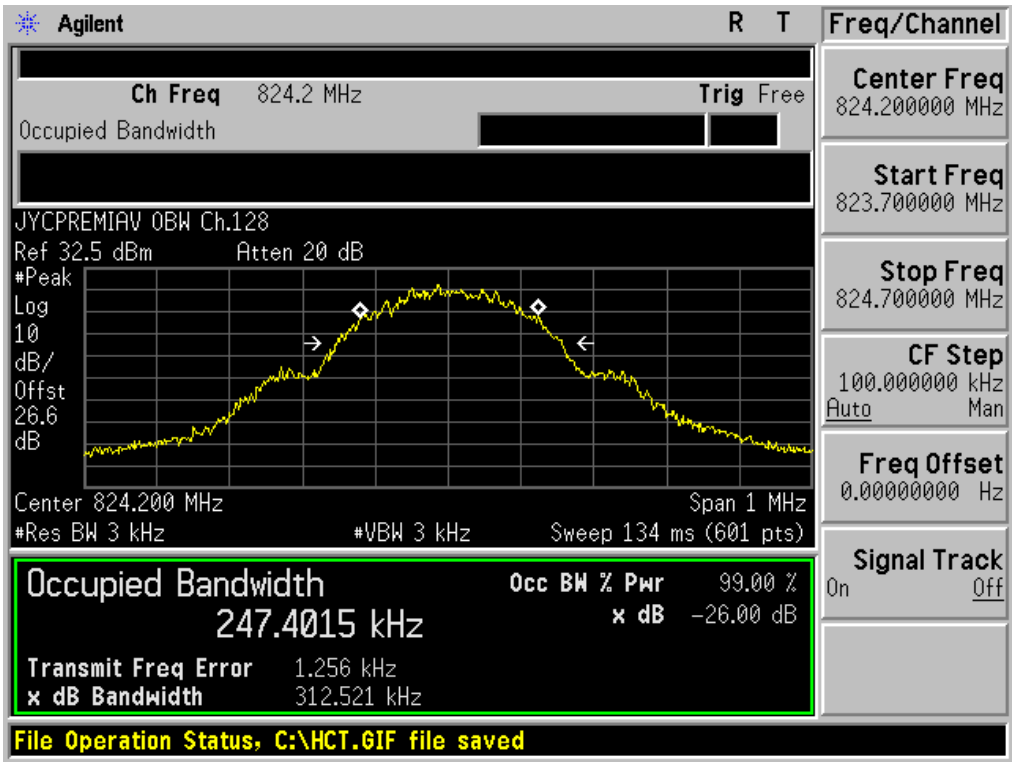
DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.700	+20(Ref)	1880 000 014	0	0.000 000	0.000
100%		-30	1880 000 003	-10.55	-0.000 001	-0.006
100%		-20	1880 000 005	-8.71	0.000 000	-0.005
100%		-10	1879 999 999	-14.49	-0.000 001	-0.008
100%		0	1880 000 000	-13.28	-0.000 001	-0.007
100%		+10	1880 000 001	-12.64	-0.000 001	-0.007
100%		+30	1880 000 004	-9.78	-0.000 001	-0.005
100%		+40	1880 000 000	-13.65	-0.000 001	-0.007
100%		+50	1880 000 001	-12.07	-0.000 001	-0.006
115%	4.255	+20	1880 000 000	-13.78	-0.000 001	-0.007
Batt. Endpoint	3.400	+20	1880 000 004	-9.52	-0.000 001	-0.005

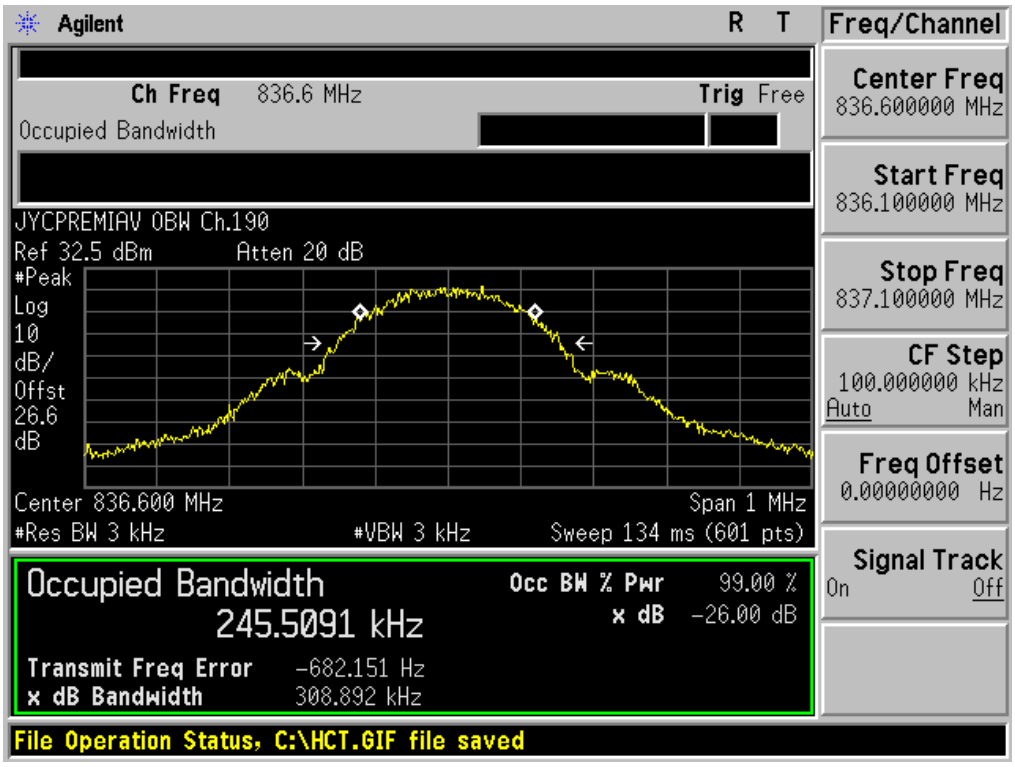


8. TEST PLOTS

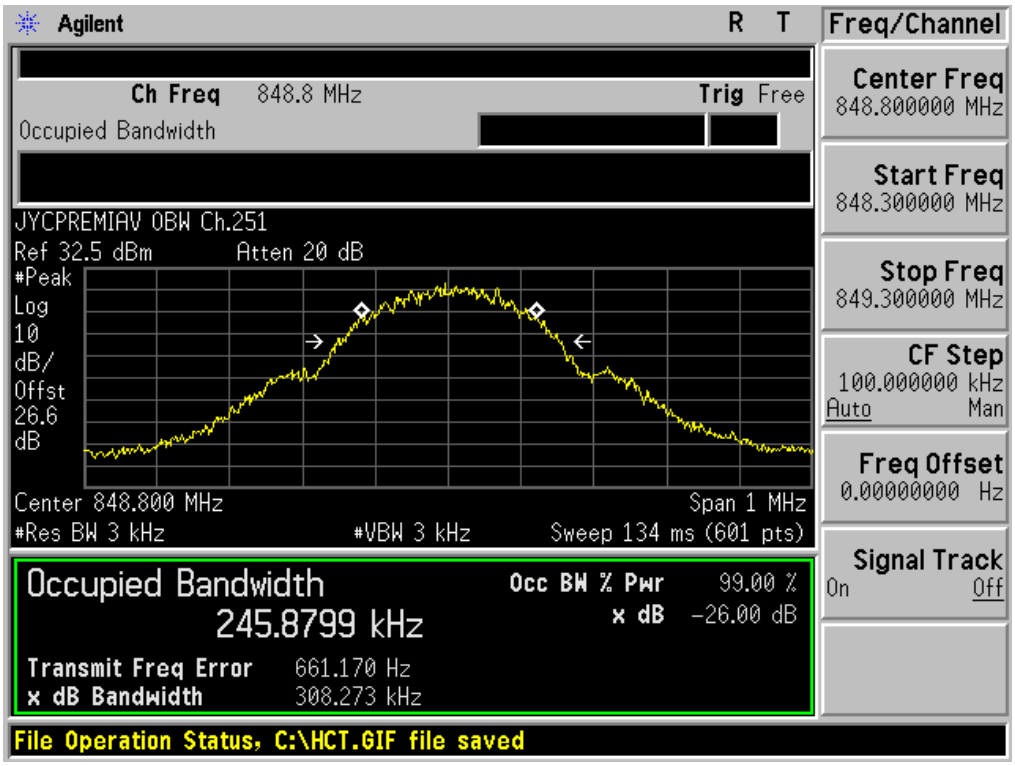
■ GSM850 MODE (128 CH.) Occupied Bandwidth



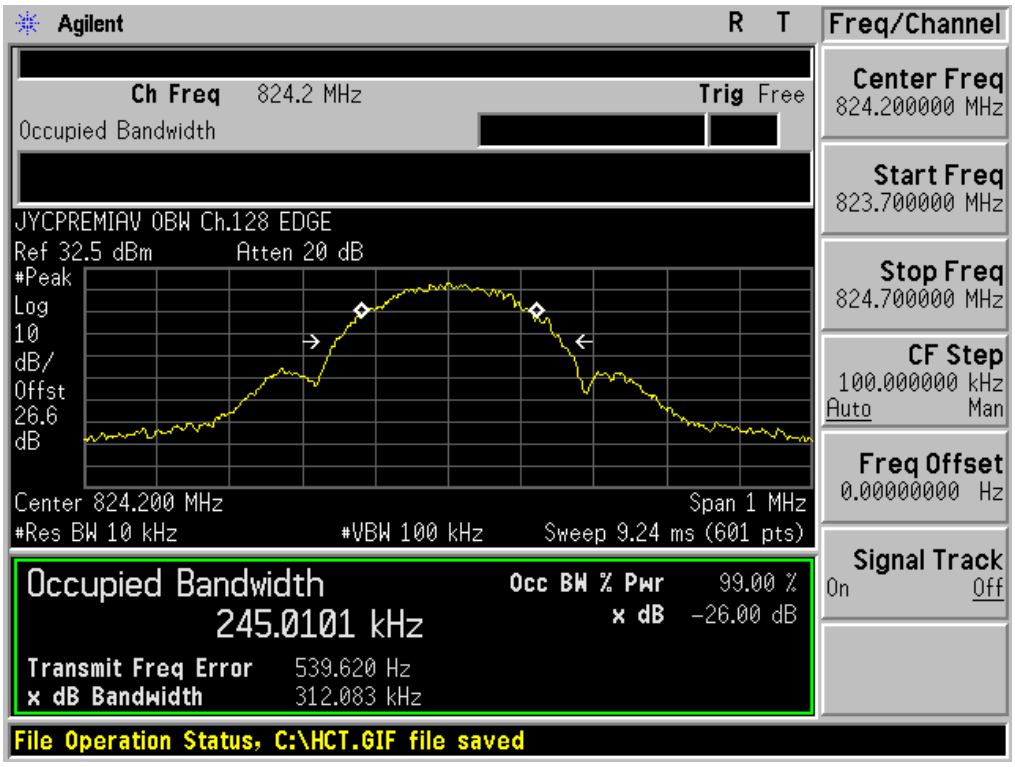
■ GSM850 MODE (190 CH.) Occupied Bandwidth



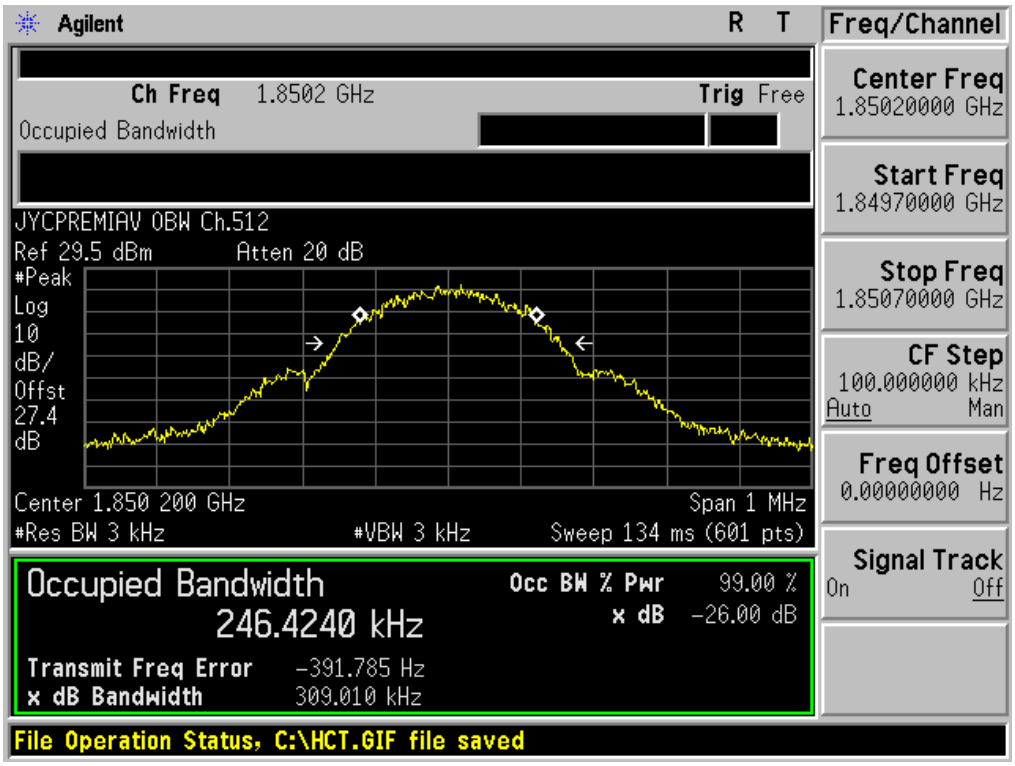
■ GSM850 MODE (251 CH.) Occupied Bandwidth



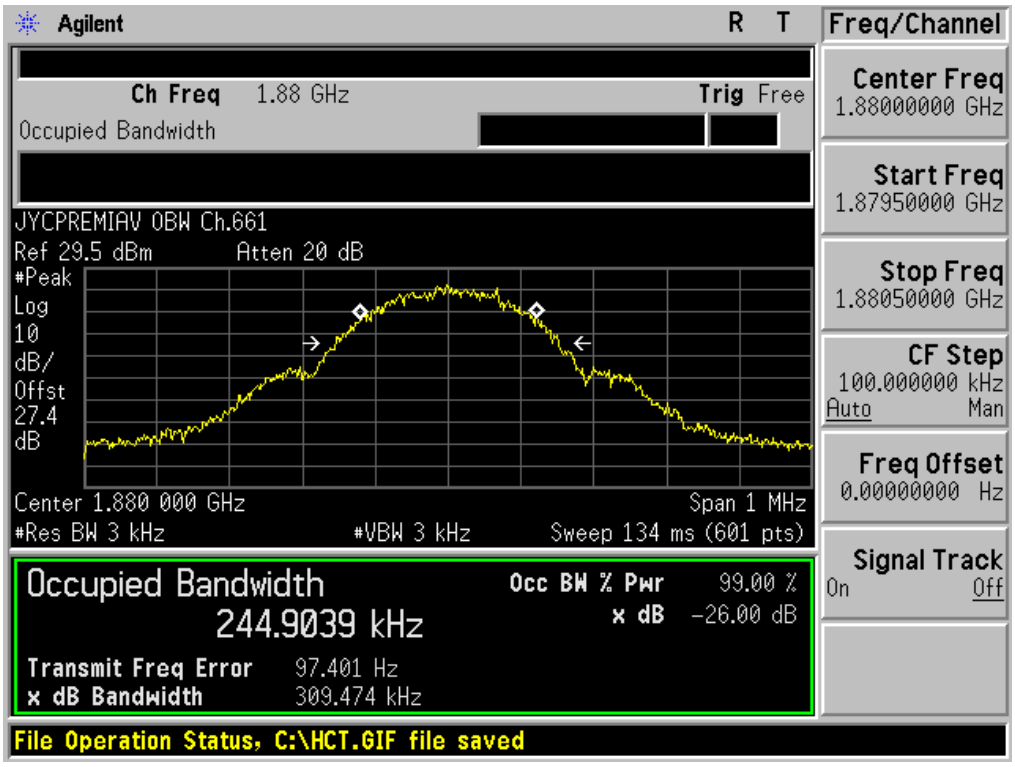
■ GSM850 EDGE (128 CH.) Occupied Bandwidth



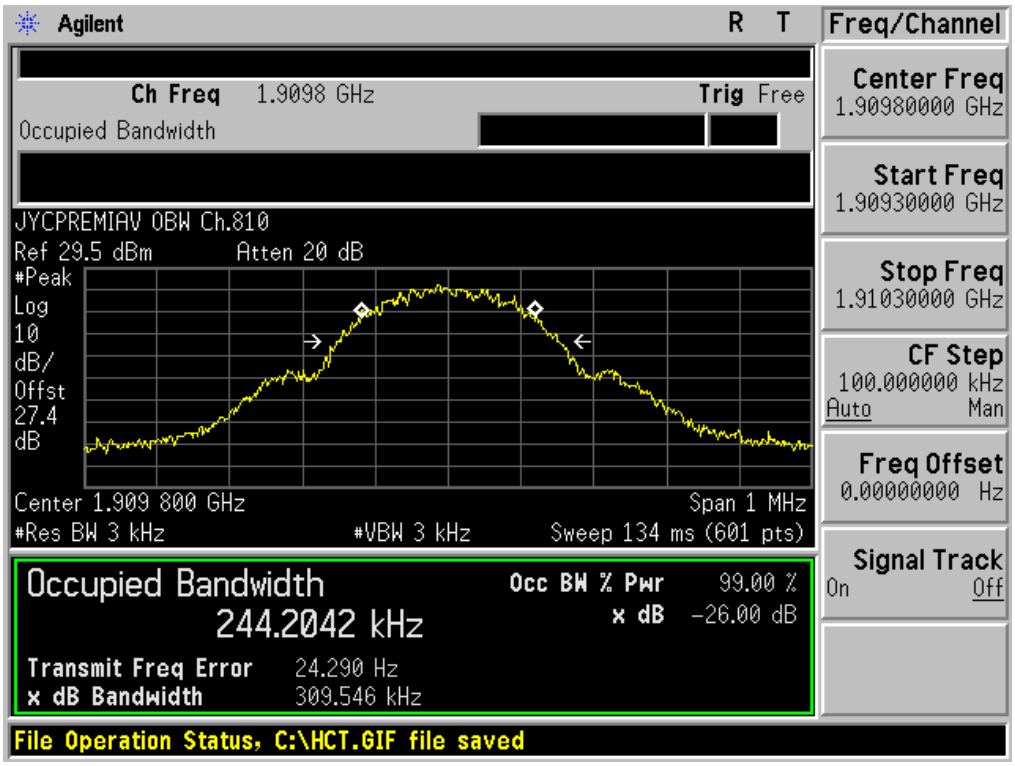
■ GSM1900 MODE (512 CH.) Occupied Bandwidth



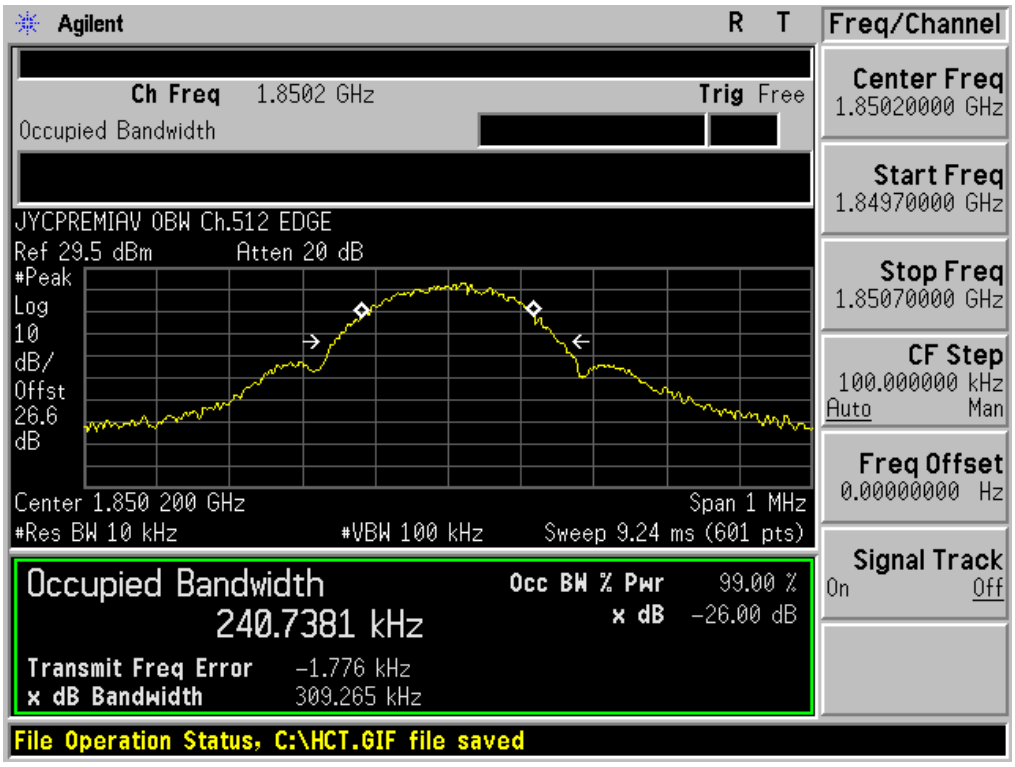
■ GSM1900 MODE (661 CH.) Occupied Bandwidth



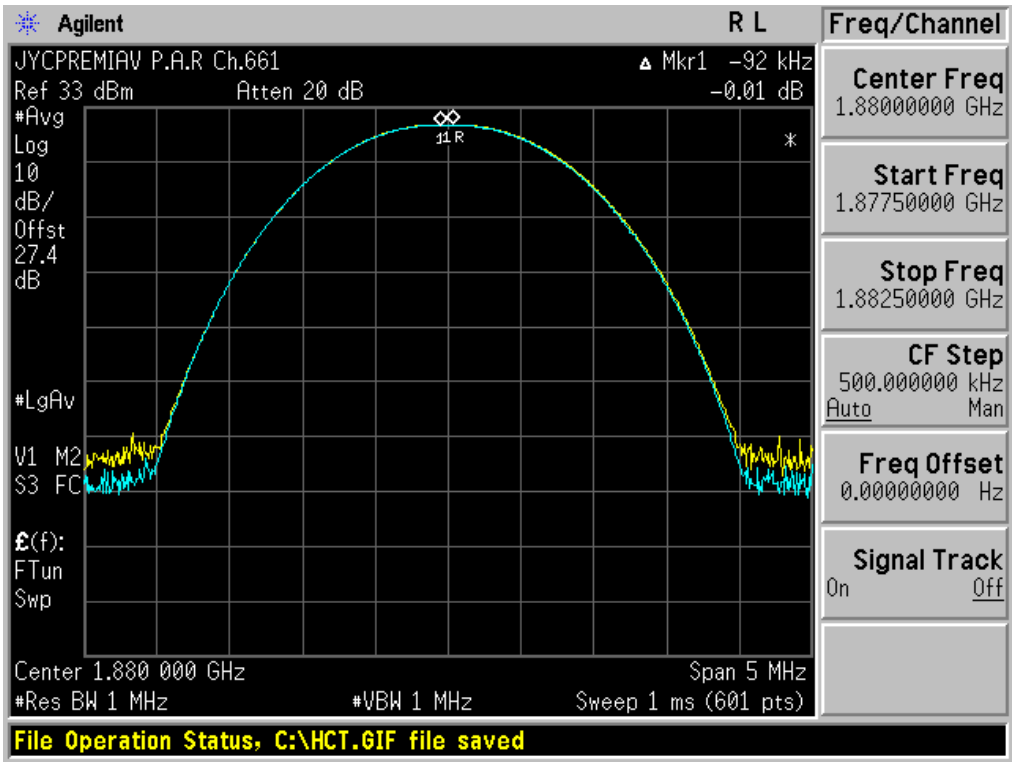
■ GSM1900 MODE (810 CH.) Occupied Bandwidth



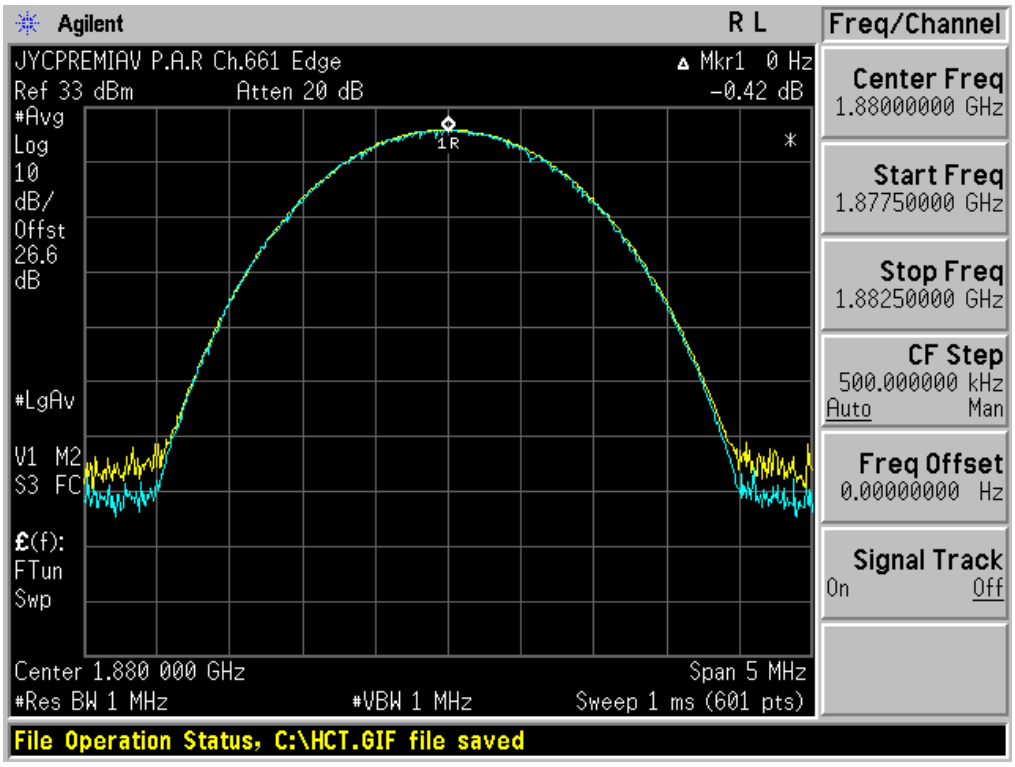
■ GSM1900 EDGE (512 CH.) Occupied Bandwidth



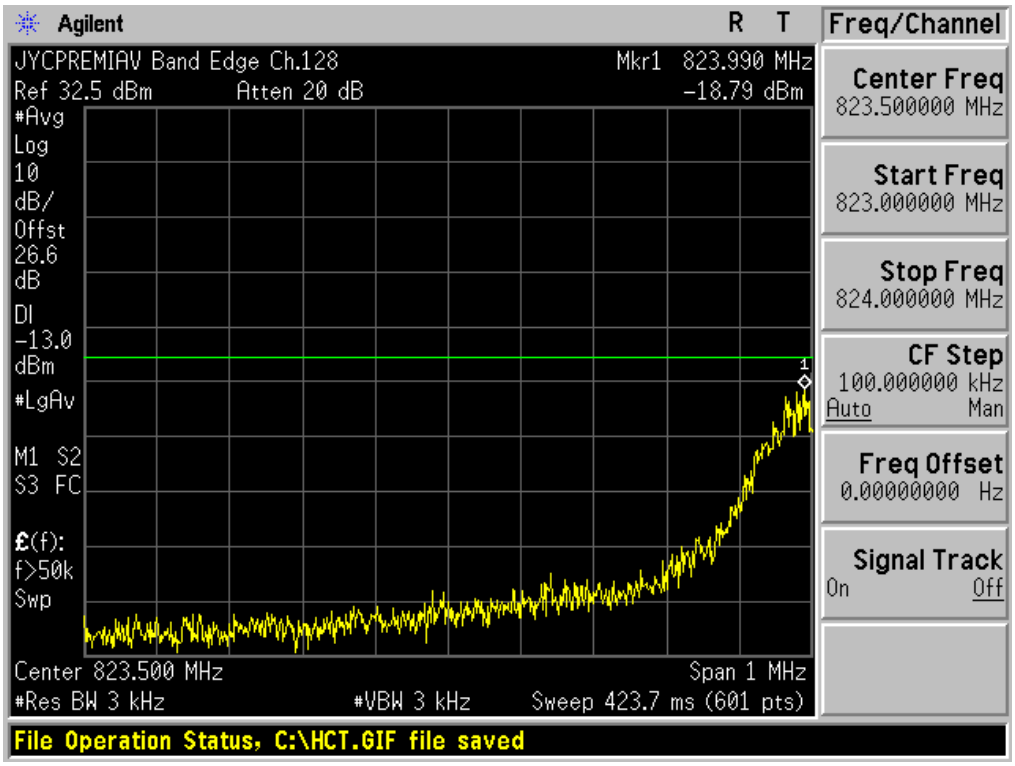
■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio



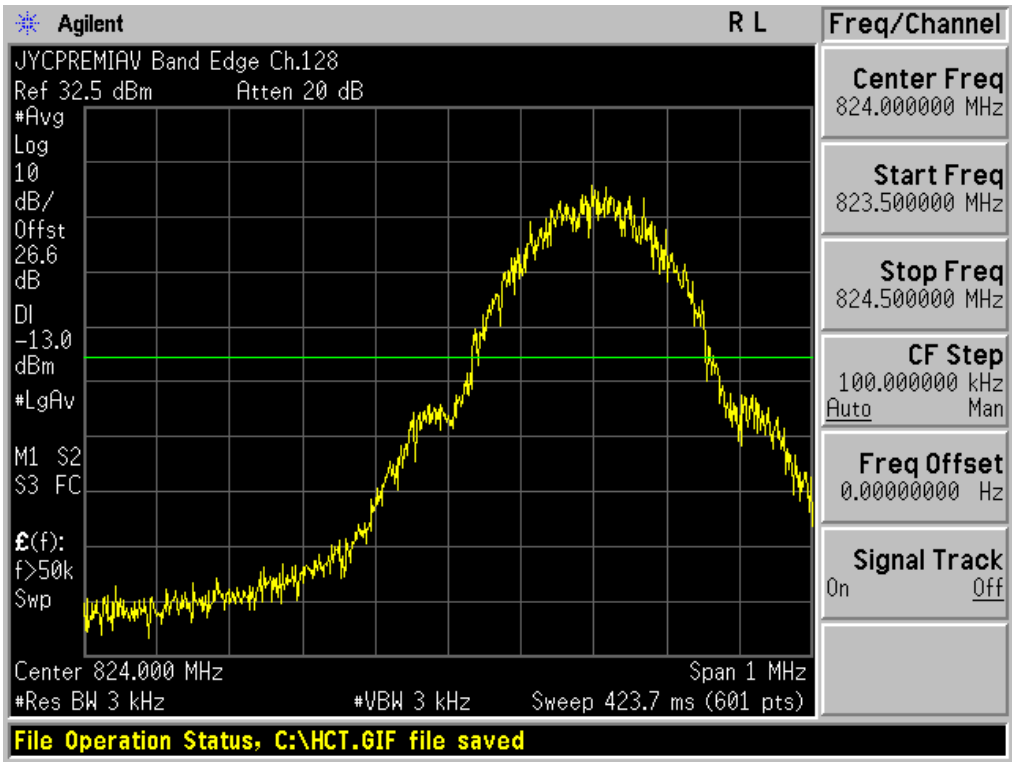
■ GSM1900 EDGE MODE (661 CH.) Peak-to-Average Ratio



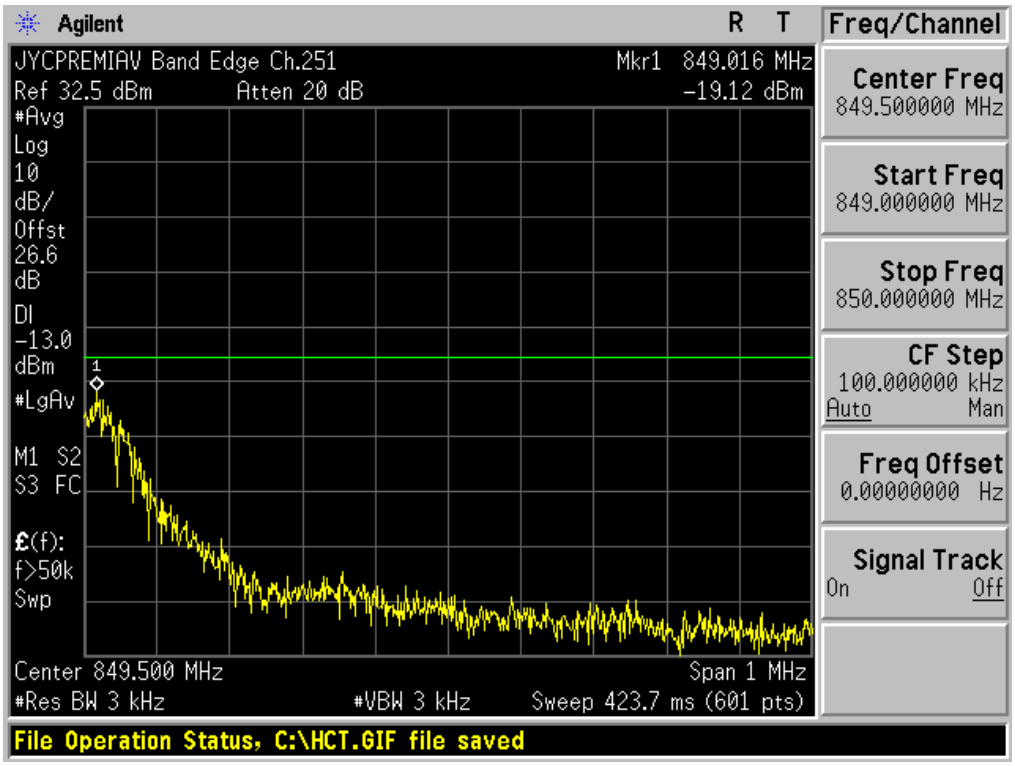
■ GSM850 MODE (128 CH.) Block Edge 1



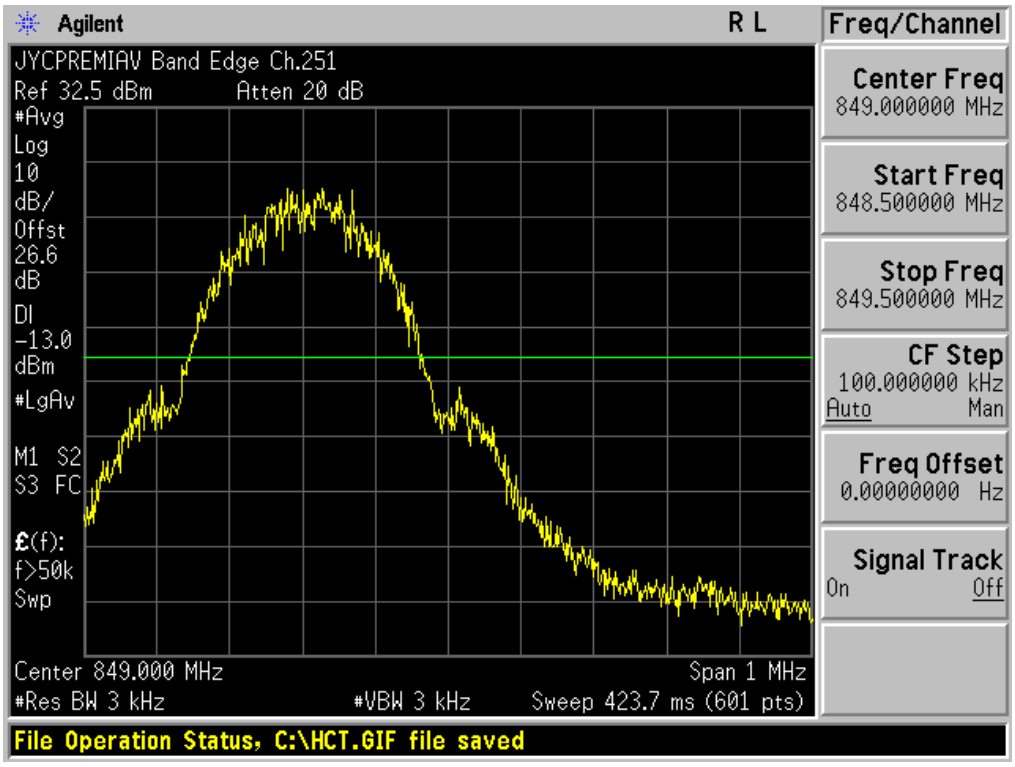
■ GSM850 MODE (128 CH.) Block Edge 2



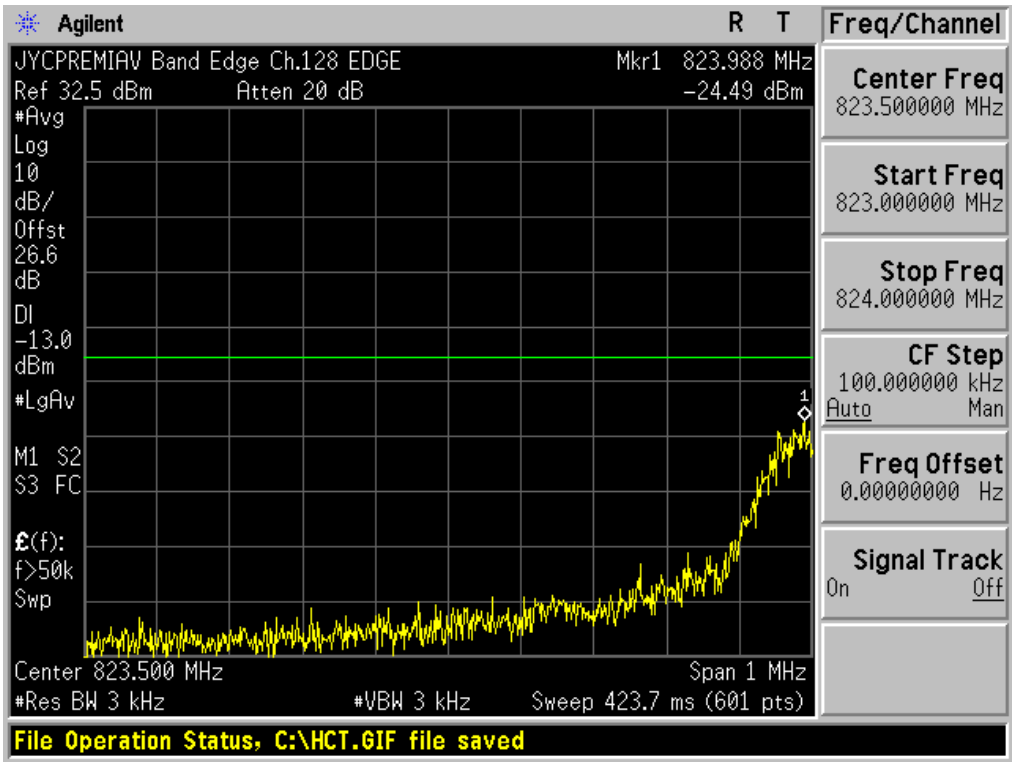
■ GSM850 MODE (251 CH.) Block Edge 1



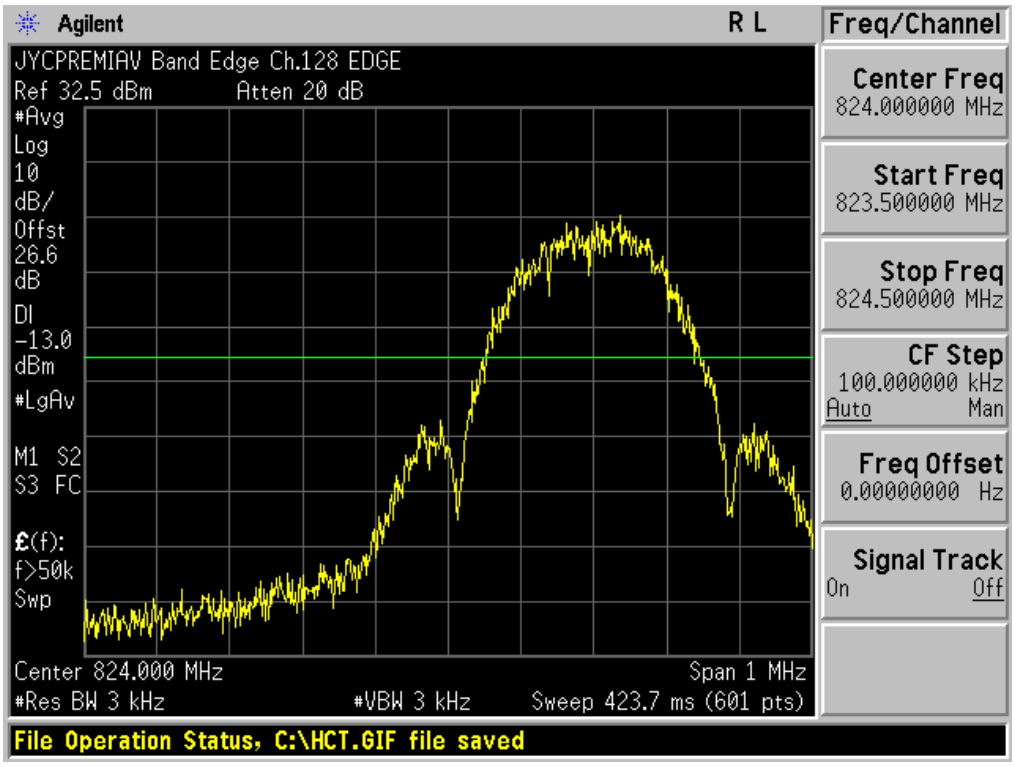
■ GSM850 MODE (251 CH.) Block Edge 2



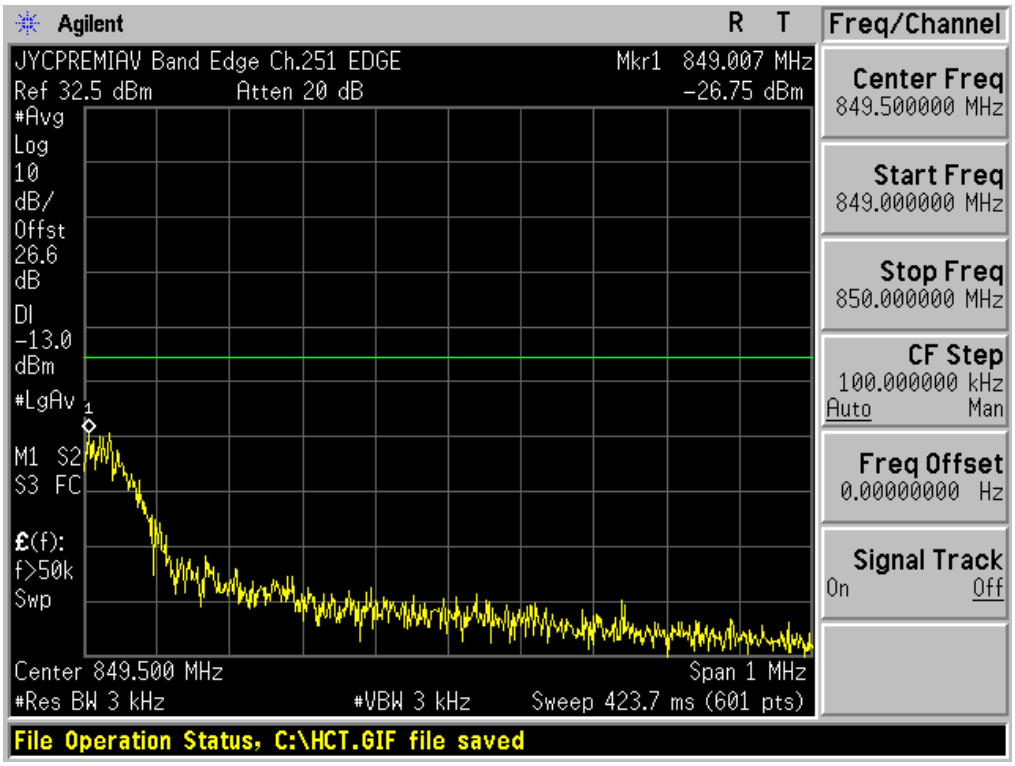
■ EDGE MODE (128 CH.) Block Edge 1



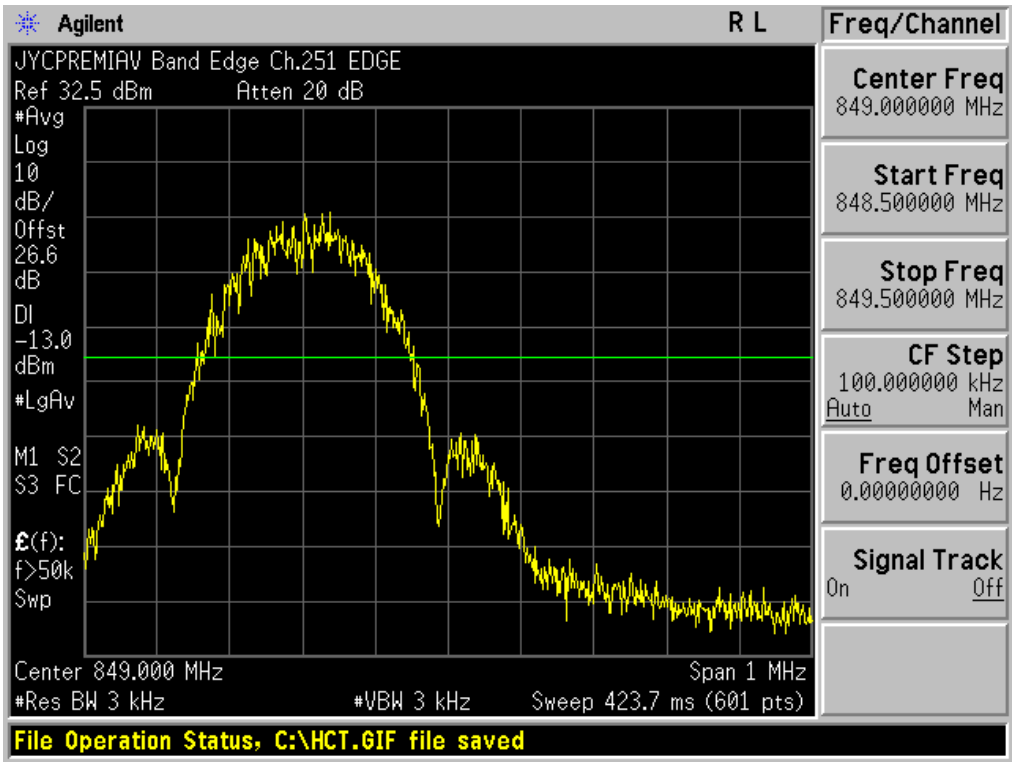
■ EDGE MODE (128 CH.) Block Edge 2



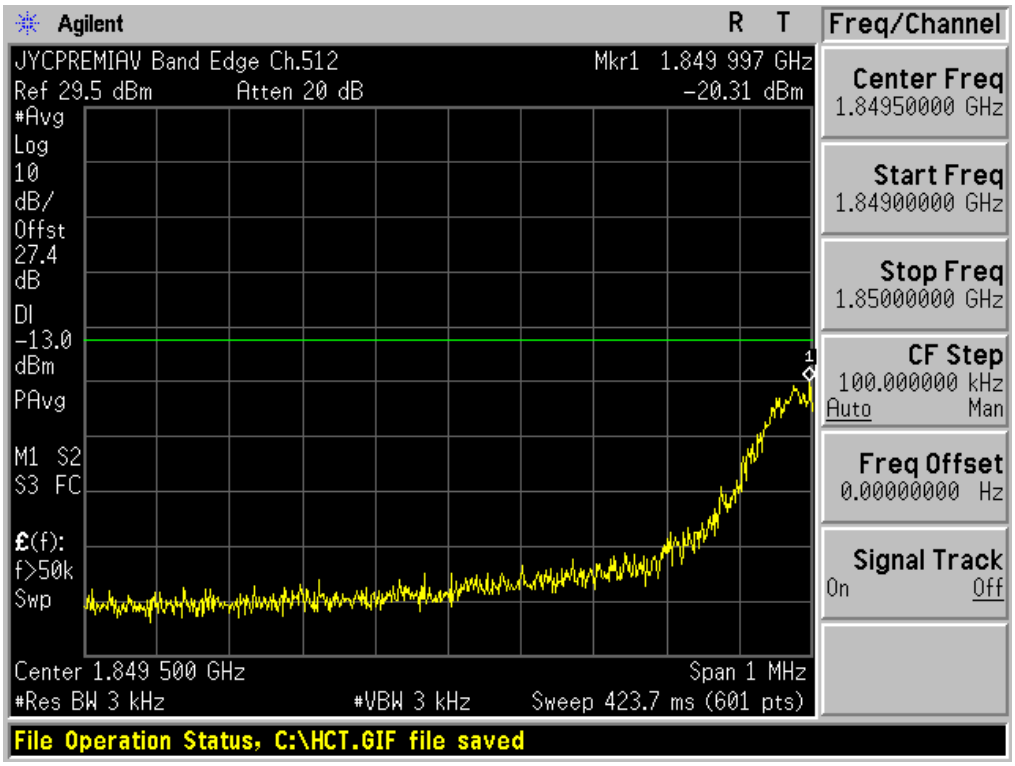
■ EDGE MODE (251 CH.) Block Edge 1



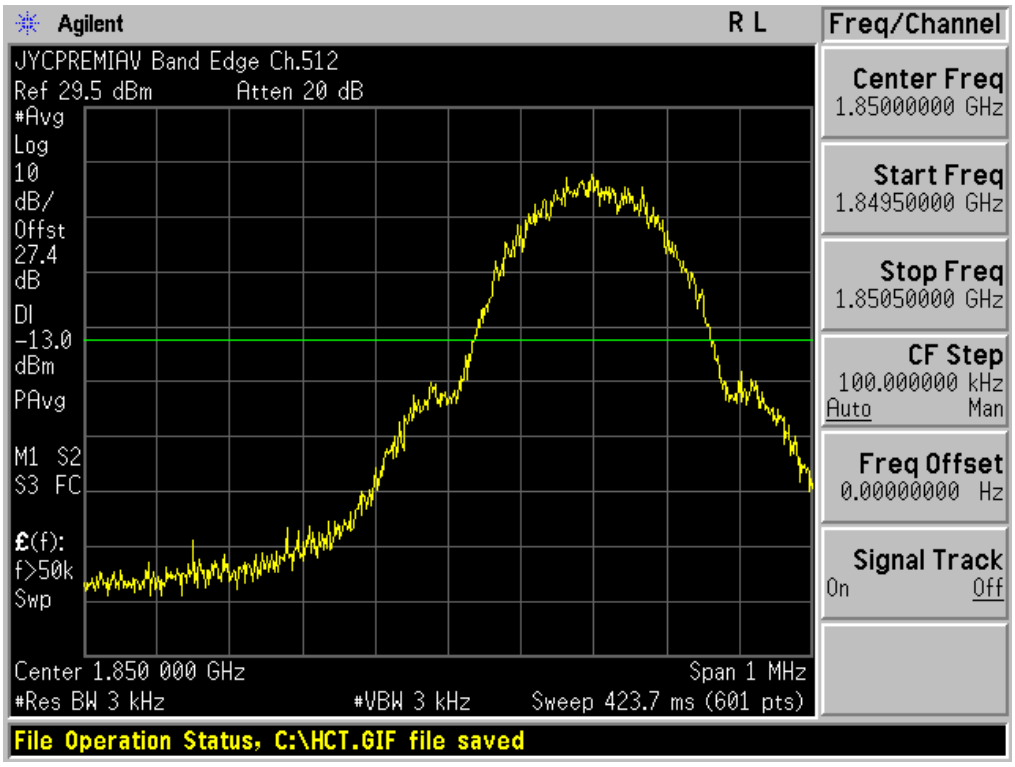
■ EDGE MODE (251 CH.) Block Edge 2



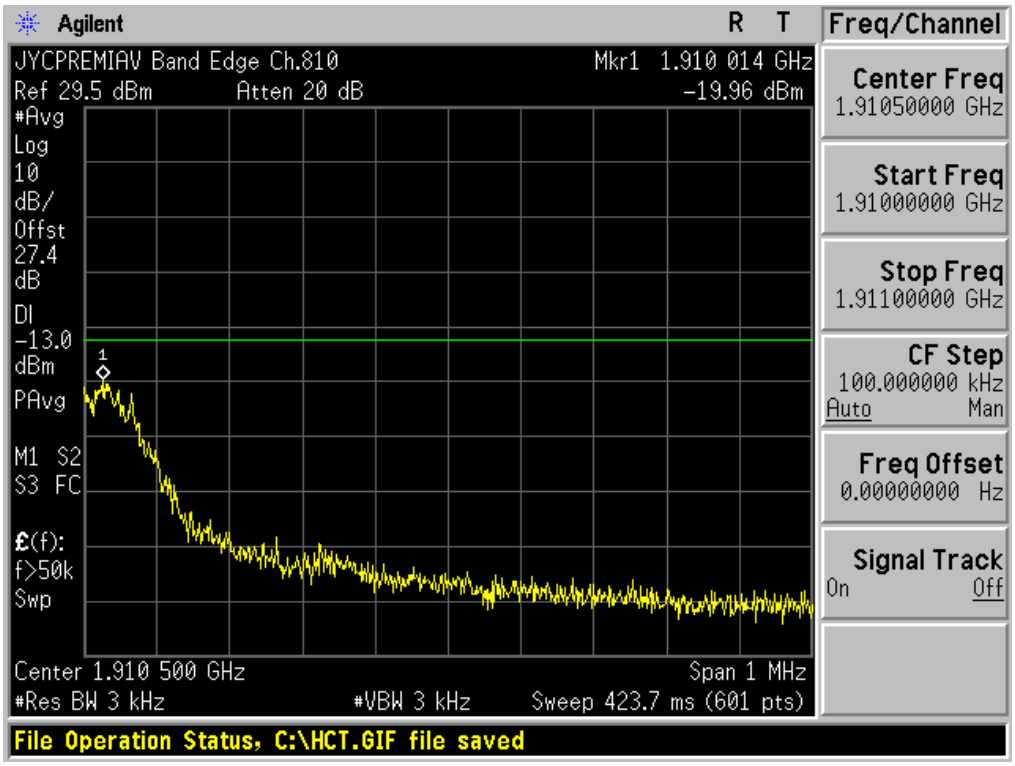
■ GSM1900 MODE (512 CH.) Block Edge 1



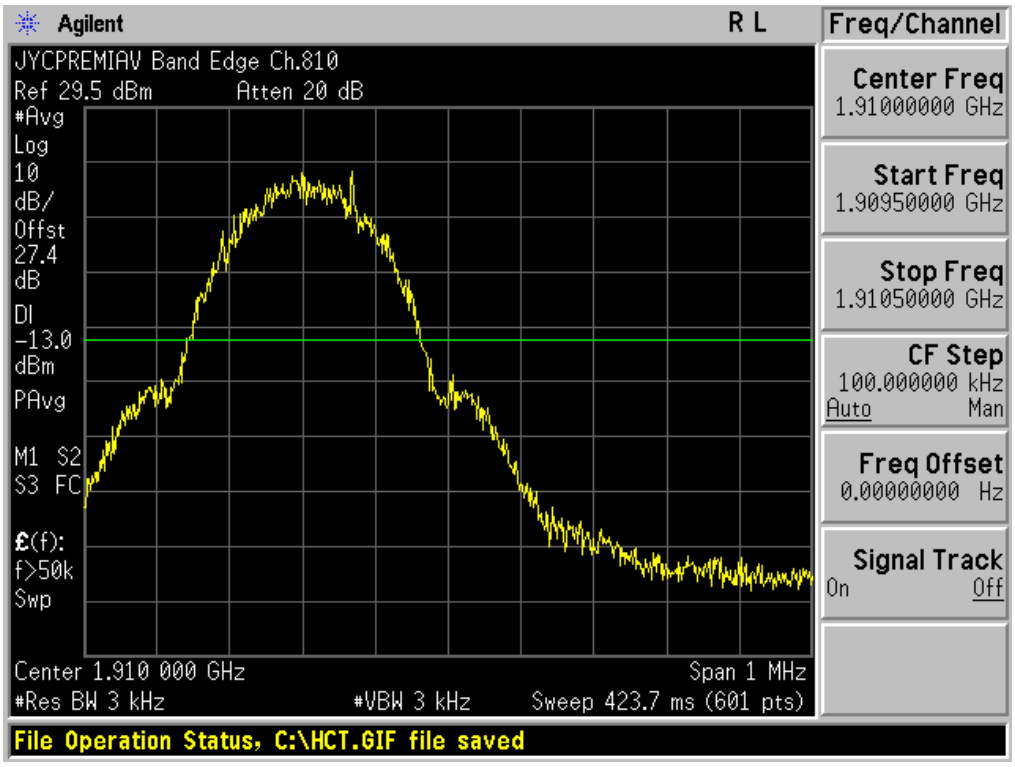
■ GSM1900 MODE (512 CH.) Block Edge 2



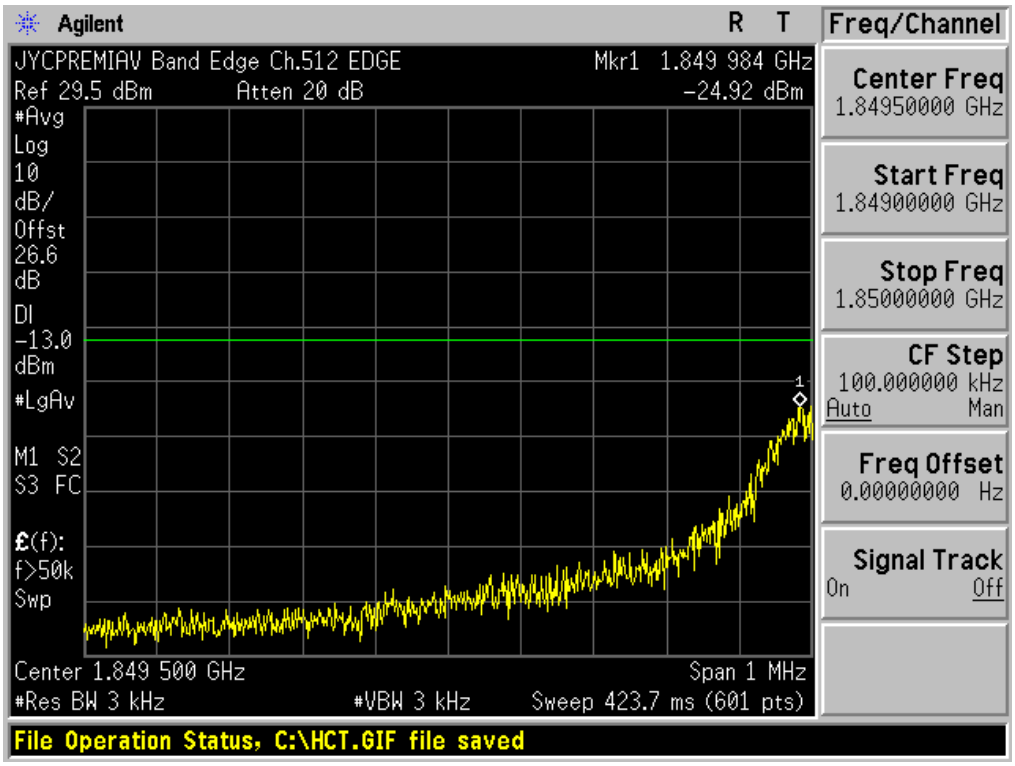
■ GSM1900 MODE (810 CH.) Block Edge 1



■ GSM1900 MODE (810 CH.) Block Edge 2



■ EDGE MODE (512 CH.) Block Edge 1



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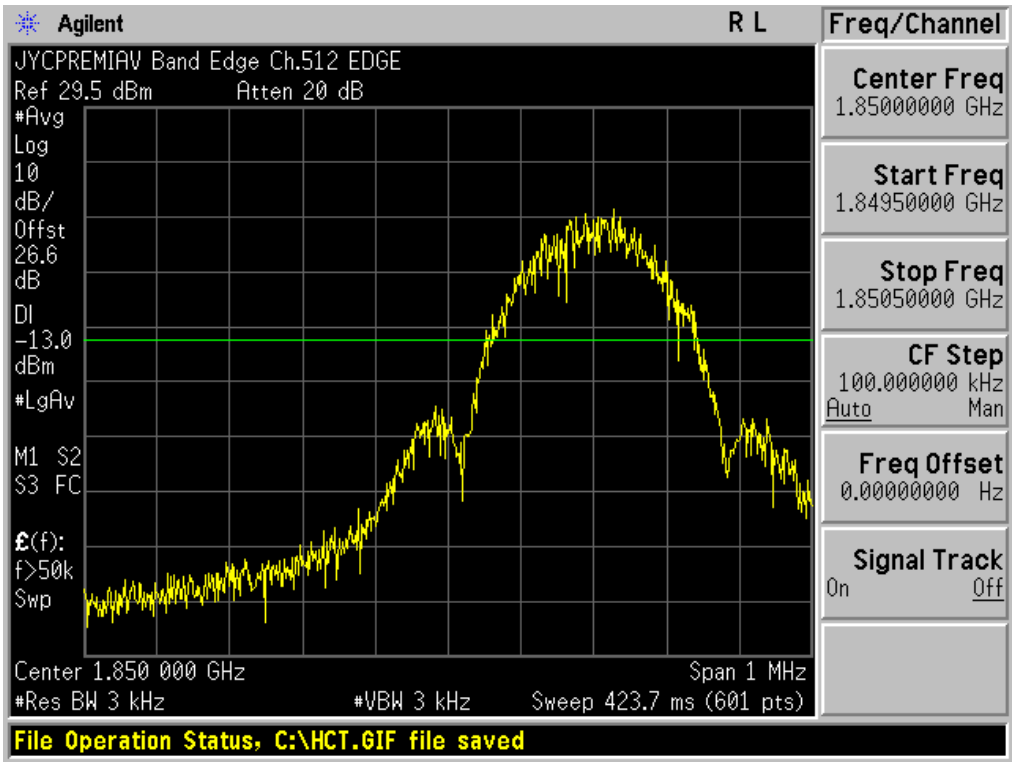
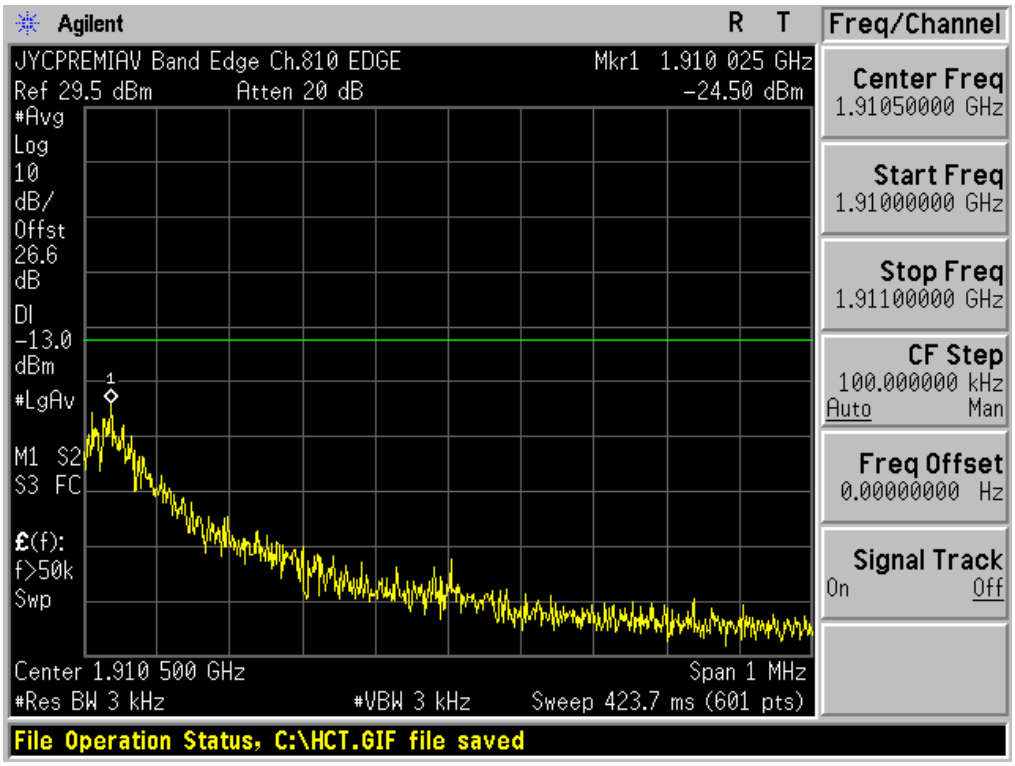
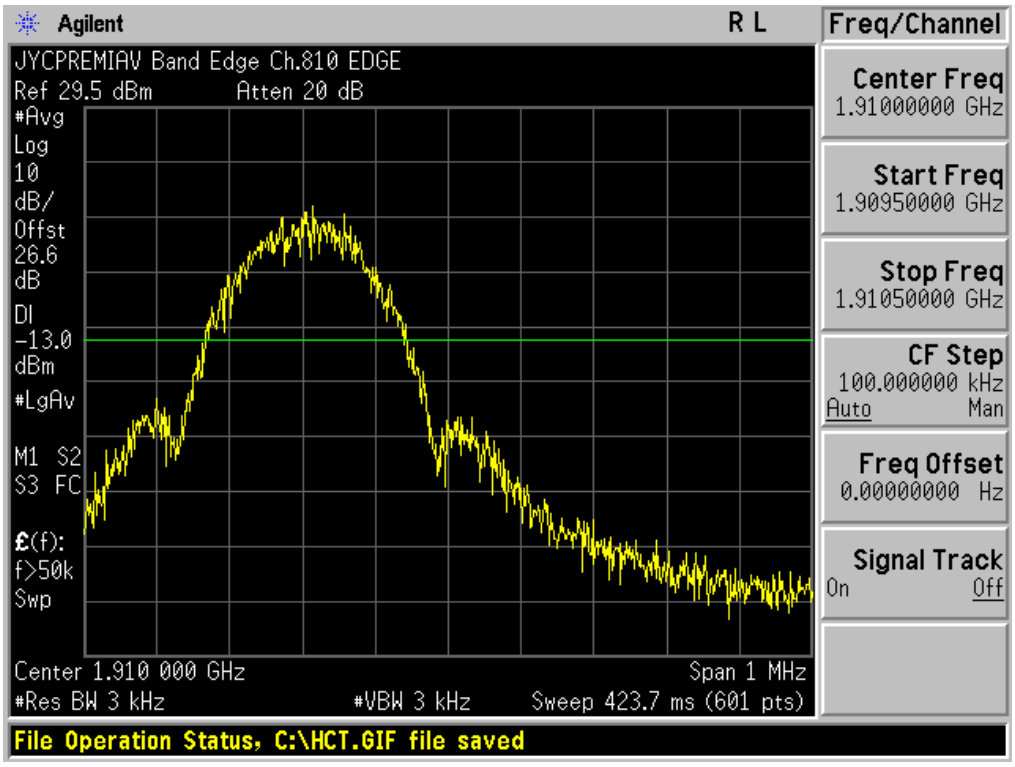


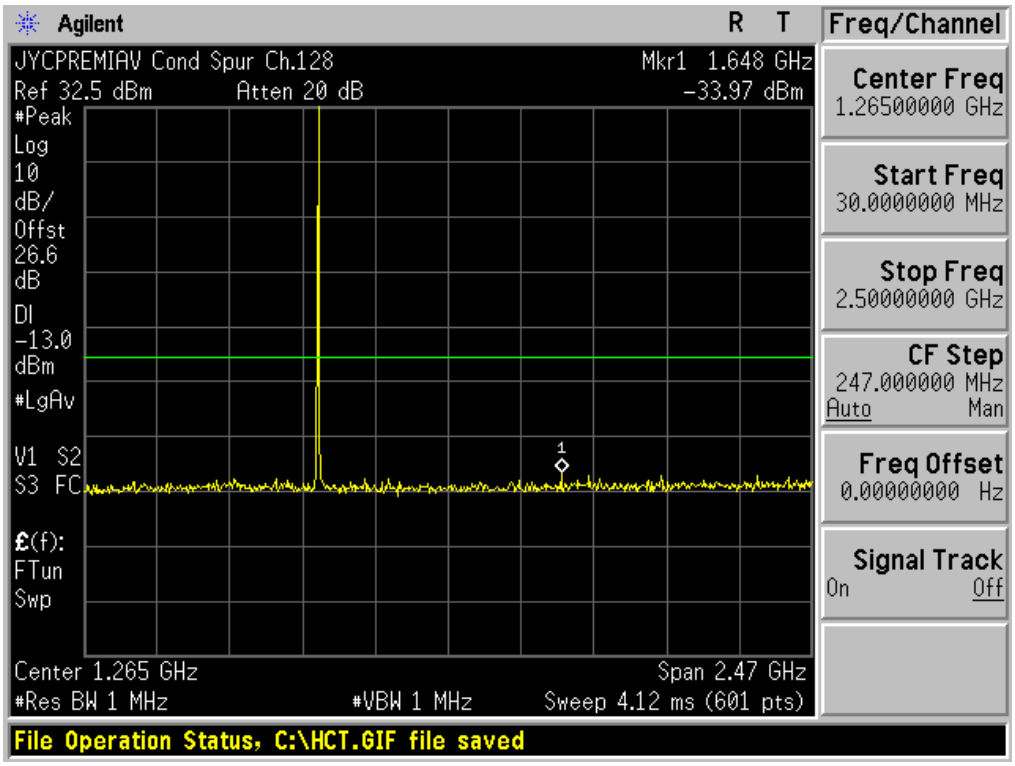
■ EDGE MODE (810 CH.) Block Edge 1



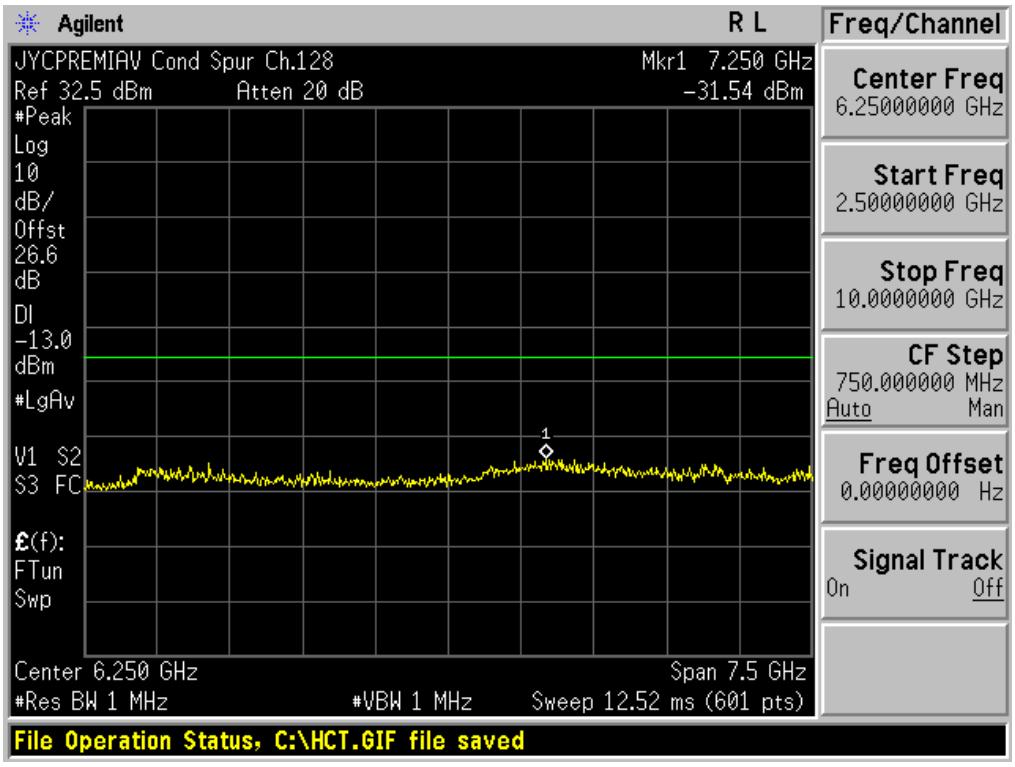
■ EDGE MODE (810 CH.) Block Edge 2



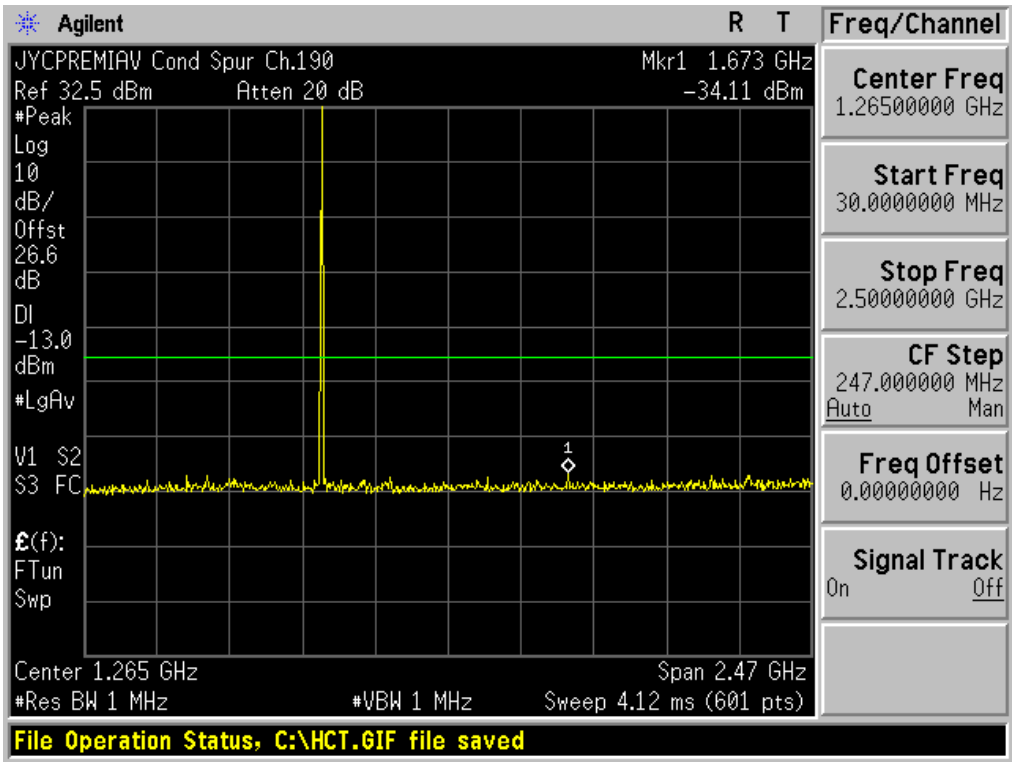
■ GSM850 MODE (128 CH.) Conducted Spurious Emissions1



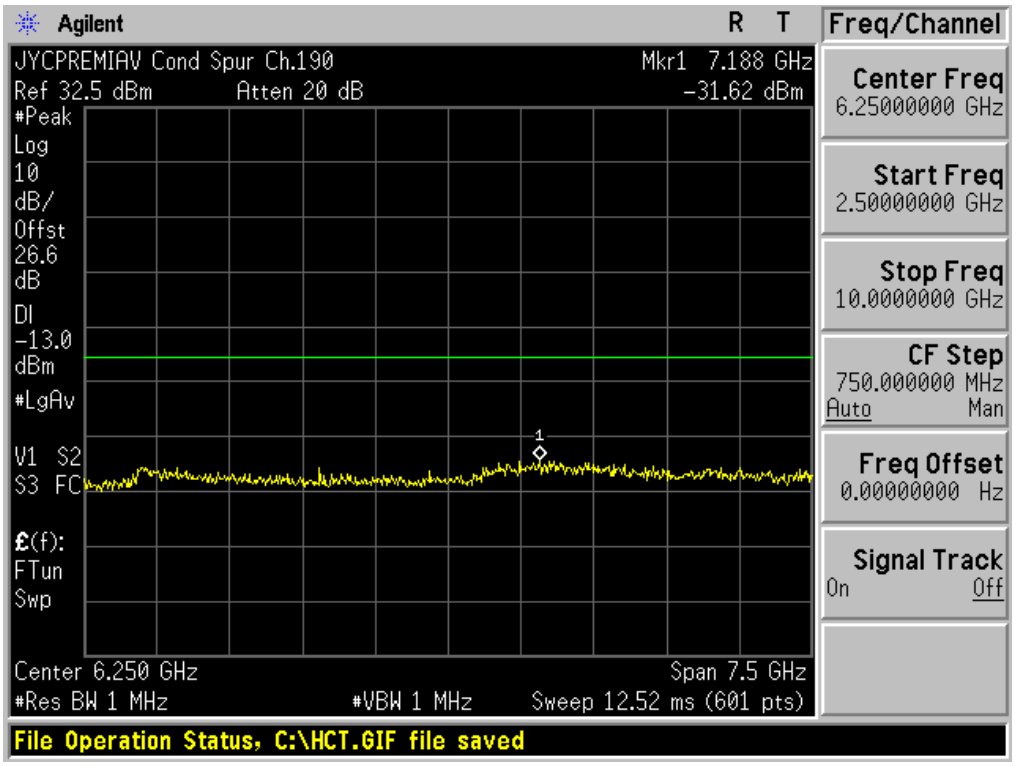
■ GSM850 MODE (128 CH.) Conducted Spurious Emissions2



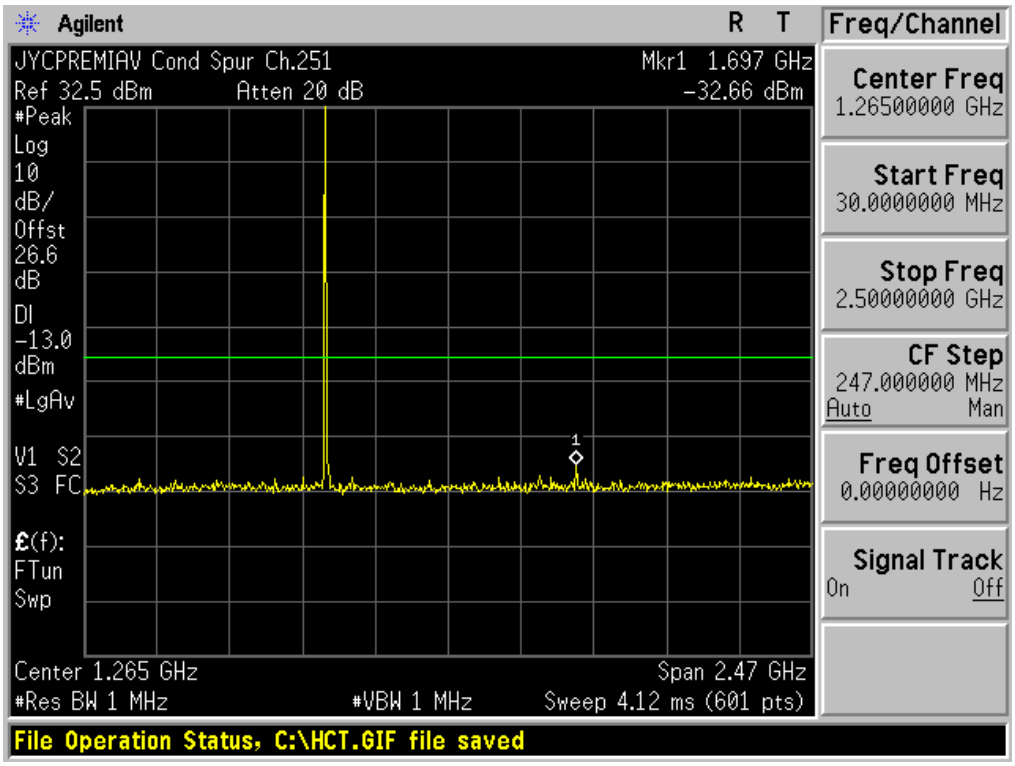
■ GSM850 MODE (190 CH.) Conducted Spurious Emissions1



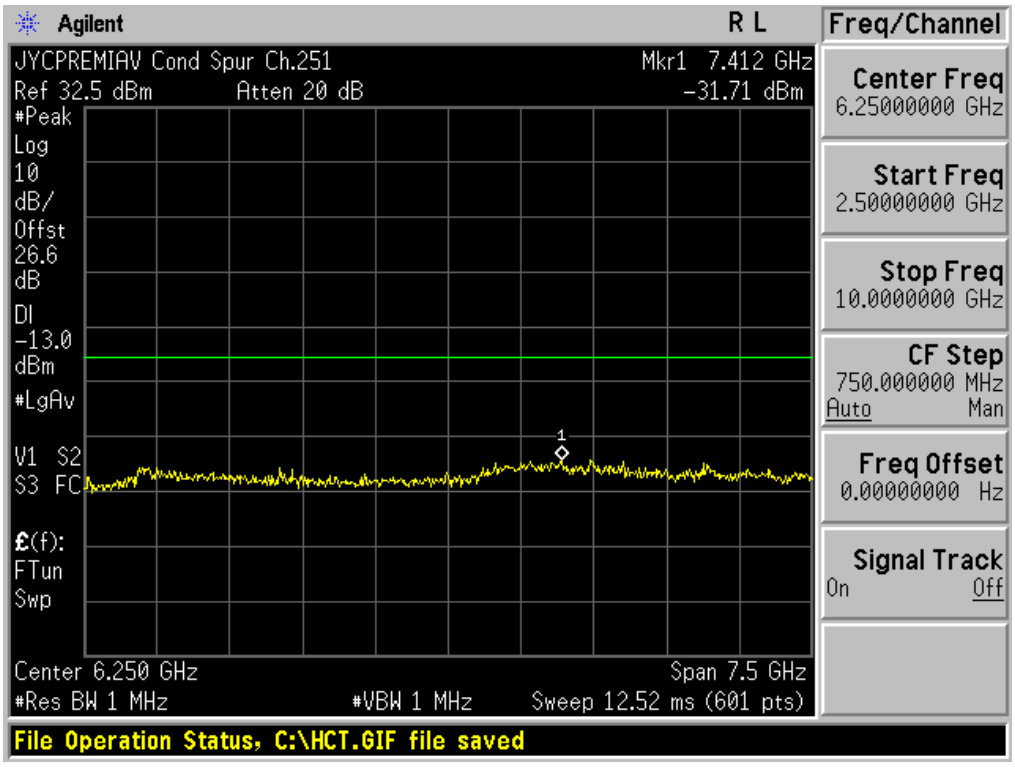
■ GSM850 MODE (190 CH.) Conducted Spurious Emissions2



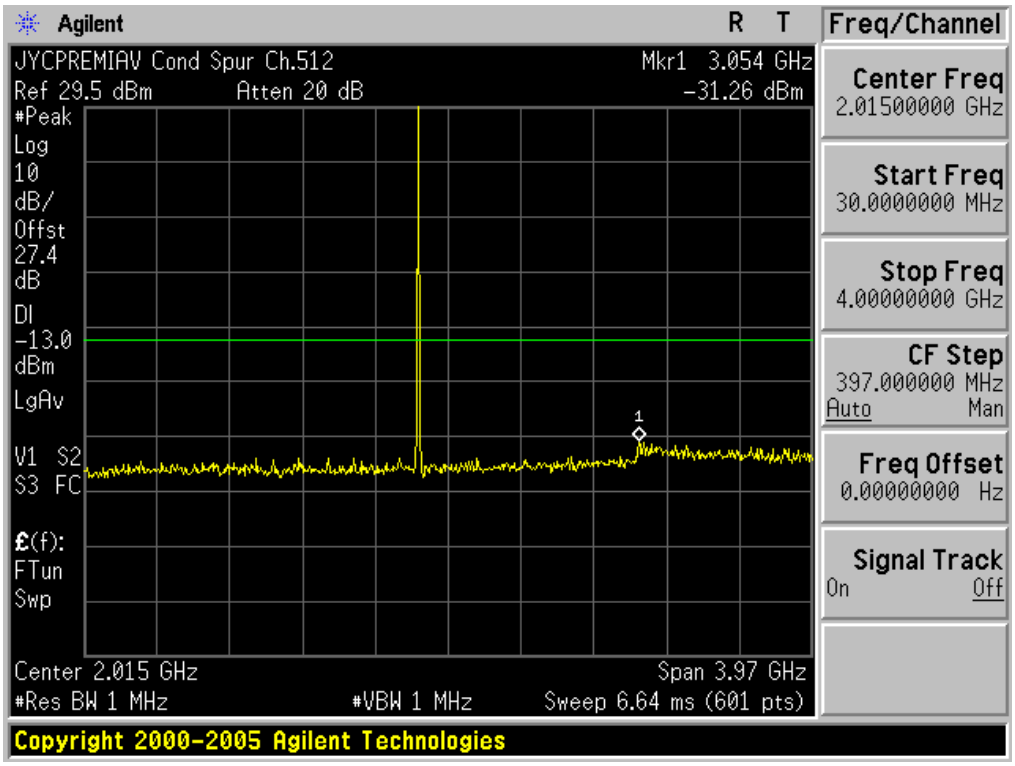
■ GSM850 MODE (251 CH.) Conducted Spurious Emissions1



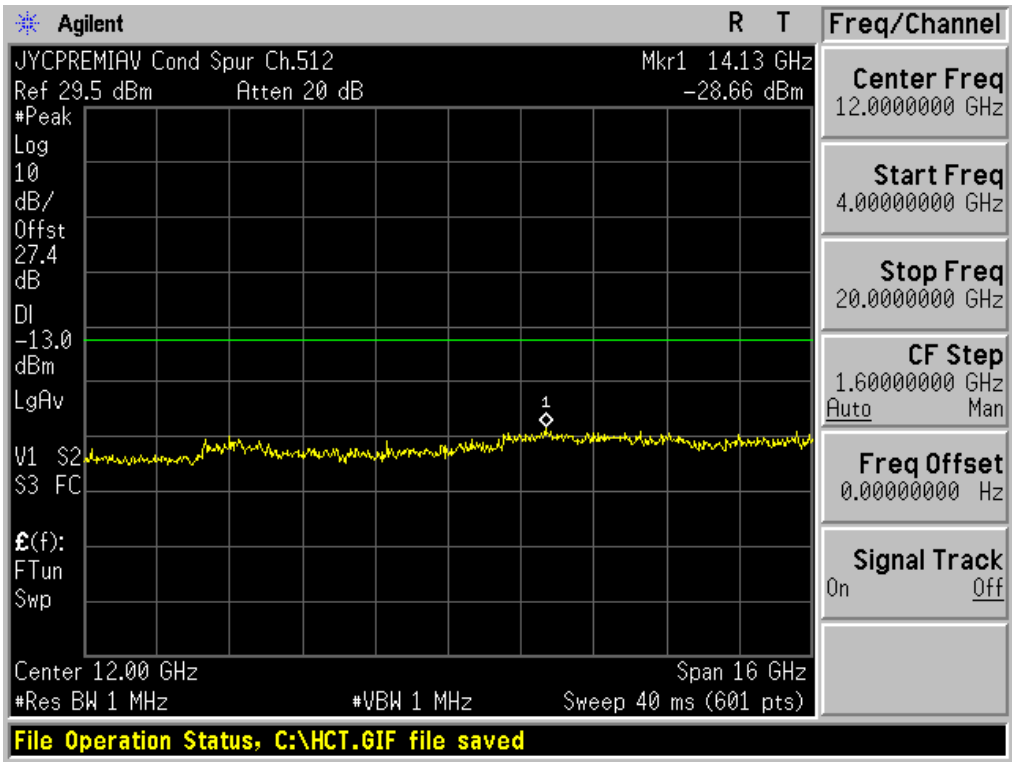
■ GSM850 MODE (251 CH.) Conducted Spurious Emissions2



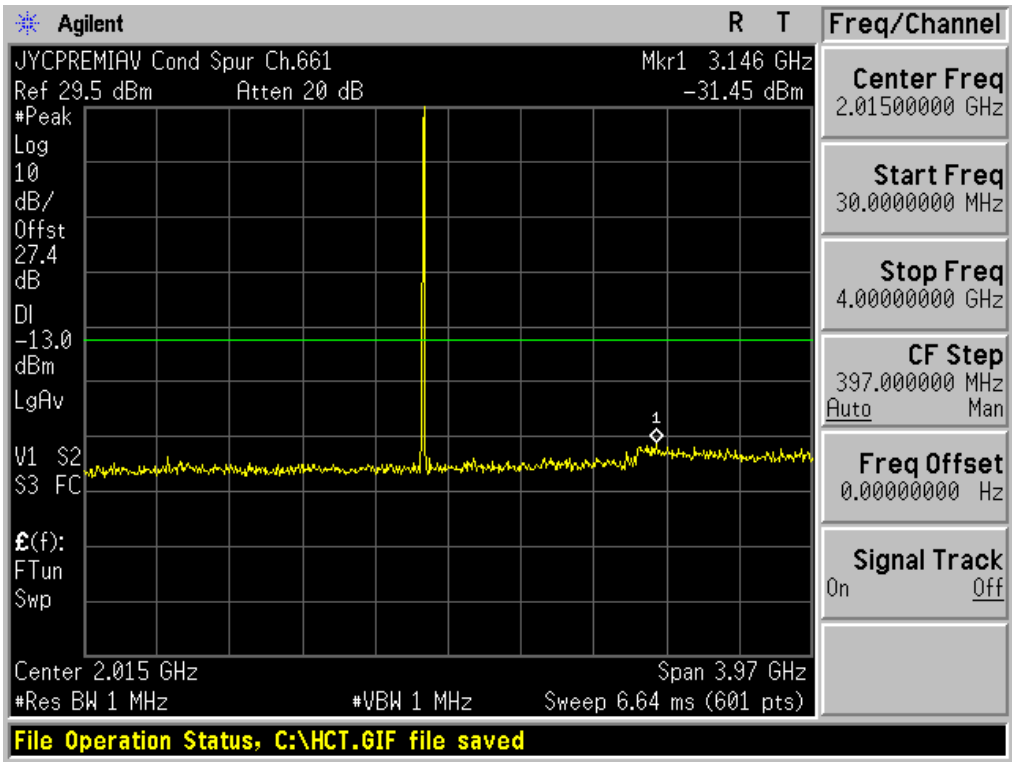
■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions1



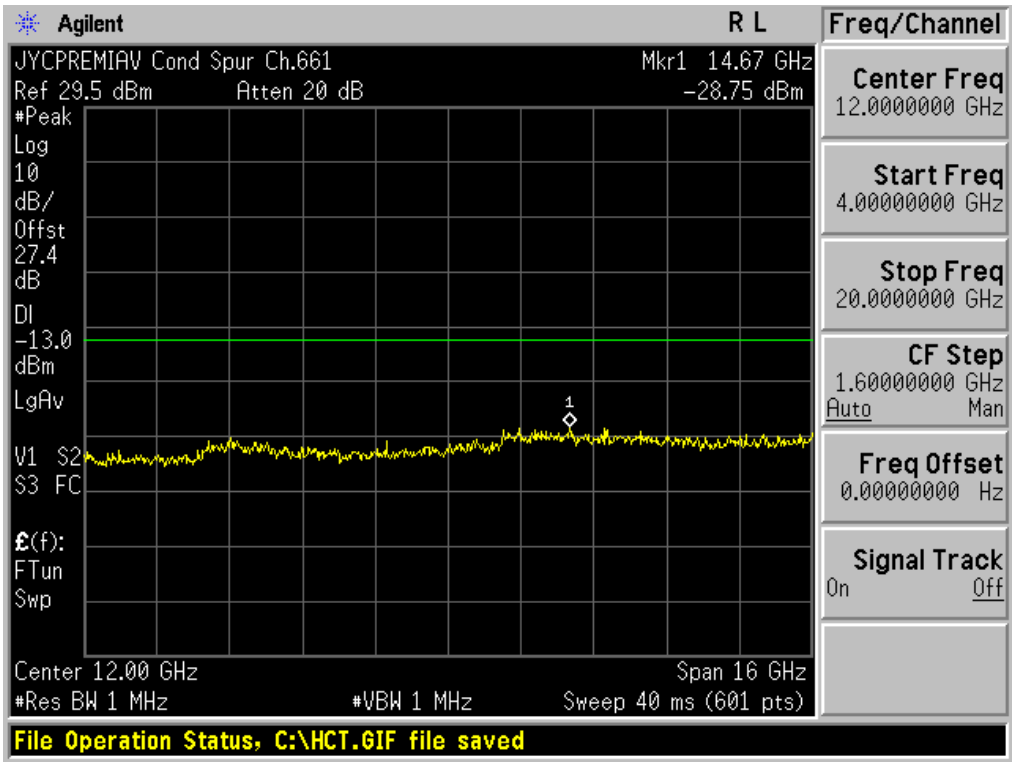
■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions2



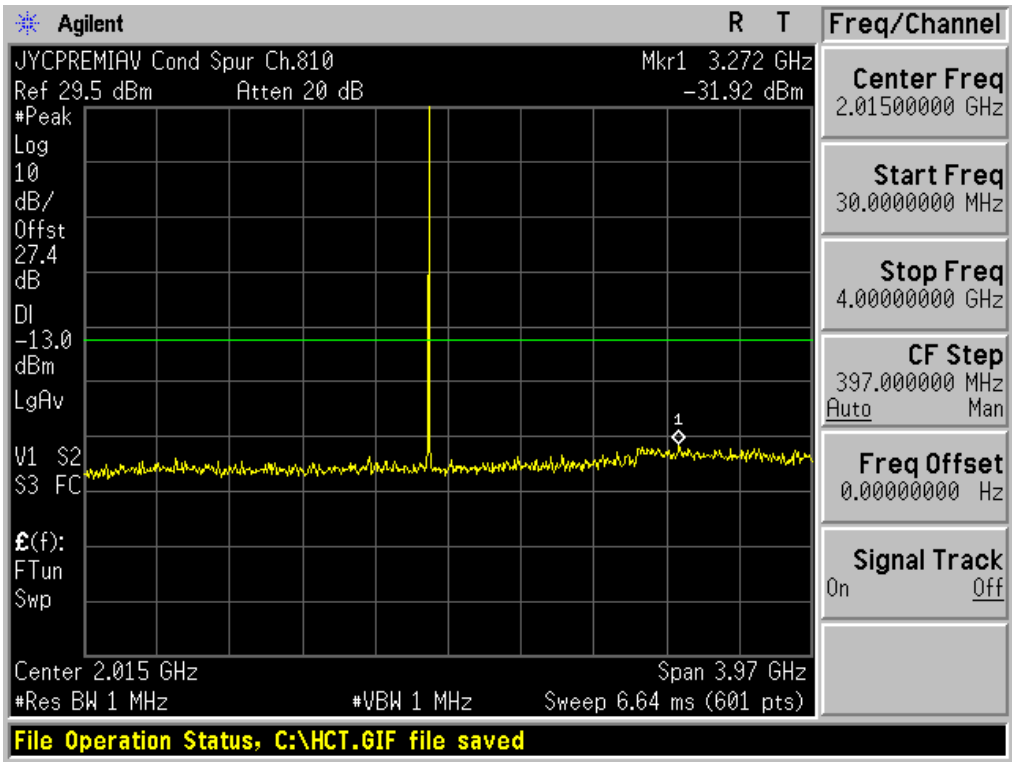
■ GSM1900 MODE (661 CH) Conducted Spurious Emissions1



■ GSM1900 MODE (661 CH.) Conducted Spurious Emissions2



■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions1



■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions2