

# RF TEST REPORT

Test item : Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA  
Phone with Bluetooth and WLAN

Model No. : LG-P720, P720, LGP720

Order No. : 1112-01758

Date of receipt : 2011-12-14

Test duration : 2012-01-04 ~ 2012-01-12

Date of issue : 2012-01-25

Use of report : Original Grant

Applicant : LG Electronics MobileComm U.S.A., Inc.  
10101 Old Grove Road., San Diego, CA 92131

Test laboratory : Digital EMC Co., Ltd.  
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

Test specification : §22(H), §24(E)

Test environment : See appended test report

Test result :  Pass  Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DIGITAL EMC CO., LTD.

Tested by:



Engineer  
J.J.LEE

Witnessed by:

N/A

Reviewed by:



Technical Director  
Harvey Sung

## Test Report Version

Test Report No.	Date	Description
DRTFCC1201-0029	Jan. 25, 2012	Final version for approval

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## 1. GENERAL INFORMATION

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

**Address:** 10101 Old Grove Road., San Diego, CA 92131

**FCC ID** : ZNFP720

**FCC Classification** : Licensed Portable Transmitter Held to Ear (PCE)

**EUT Type** : Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Phone with Bluetooth and WLAN

**Model Name** : LG-P720

**Add Model Name** : P720, LGP720  
※ Three models are same mechanical, electrical and functional.  
※ The only difference is the model name, which are changed for marketing purpose.

**Supplying power** : Standard Battery  
- Type: Li-Ion Battery  
- M/N: BL-48LN  
- Rating: DC 3.7V & 1520mAh 5.6Wh

**Antenna Information** : Internal Antenna  
- Type: Built-In type

**Tx Frequency** : GSM850: 824.2 ~ 848.8 MHz  
GSM1900: 1850.2 ~ 1909.8 MHz  
EDGE850: 824.2 ~ 848.8 MHz  
EDGE1900: 1850.2 ~ 1909.8 MHz  
WCDMA1900: 1852.4 ~ 1907.6 MHz  
HSUPA1900: 1852.4 ~ 1907.6 MHz

**Rx Frequency** : GSM850: 869.2 ~ 893.8 MHz  
GSM1900: 1930.2 ~ 1989.8 MHz  
EDGE850: 869.2 ~ 893.8 MHz  
EDGE1900: 1930.2 ~ 1989.8 MHz  
WCDMA1900: 1932.4 ~ 1987.6 MHz  
HSUPA1900: 1932.4 ~ 1987.6 MHz

**Max. RF Output Power** : GSM850: 2.168W ERP(33.36dBm)  
GSM1900: 0.284W EIRP(24.54dBm)  
EDGE850: 0.824W ERP(29.16dBm)  
EDGE1900: 0.113W EIRP(20.53dBm)  
WCDMA1900: 0.111W EIRP(20.45dBm)  
HSUPA 1900: 0.110W EIRP(20.40dBm)

**Emission Designator(s)** : GSM850: 248KGXW  
GSM1900: 248KGXW  
EDGE850: 245KG7W  
EDGE1900: 248KG7W  
WCDMA1900: 4M08F9W  
HSUPA 1900: 4M09F9W

## **2. INTRODUCTION**

### **2.1. EUT DESCRIPTION**

The Equipment Under Test(EUT) supports a dual band(Cellular/PCS) with GSM/GPRS/EDGE, a single band(PCS) with HSUPA, Bluetooth and 802.11b/g/n(HT20).

### **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 10M test site and conducted measurement facility used to collect the radiated data are located at the 683-3, Yubang-Dong, Yongin-Si, Gyunggi-Do, 449-080, South Korea. The site is constructed in conformance with the requirements.

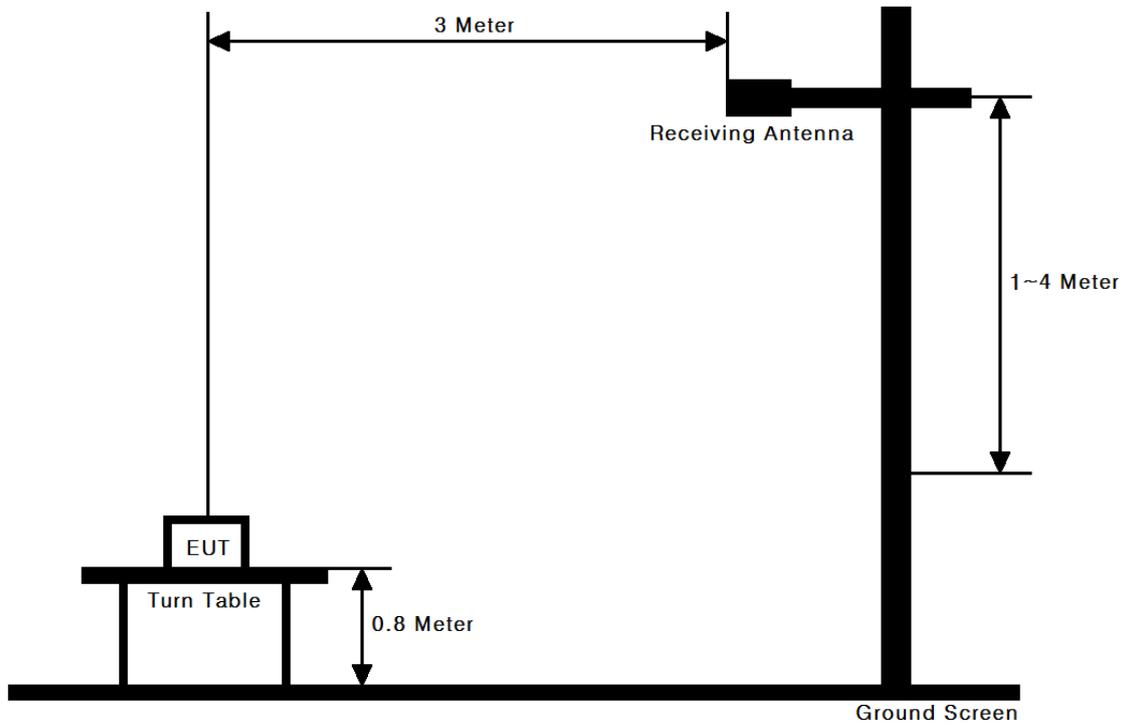
- 10M test site registration Number: 101842

### 3. DESCRIPTION OF TESTS

#### 3.1 ERP & EIRP

(Effective Radiated Power & Equivalent Isotropic Radiated Power)

##### *Test Set-up*



##### *Test Procedure*

These measurements were performed at 3meter test range. The equipment under test is placed on a wooden turntable 0.8-meters above the ground plane and 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

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.

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.

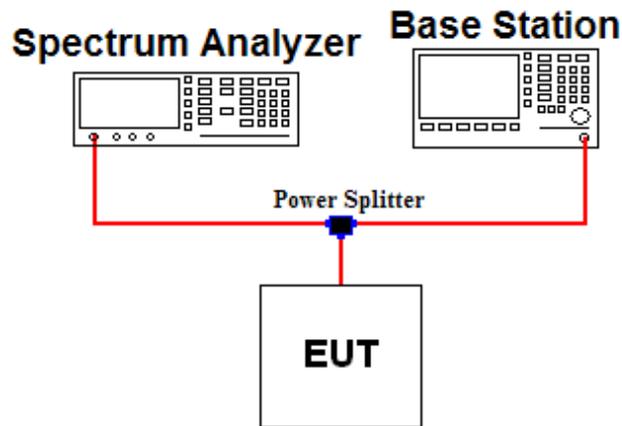
### 3.2 PEAK TO AVERAGE RATIO

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*

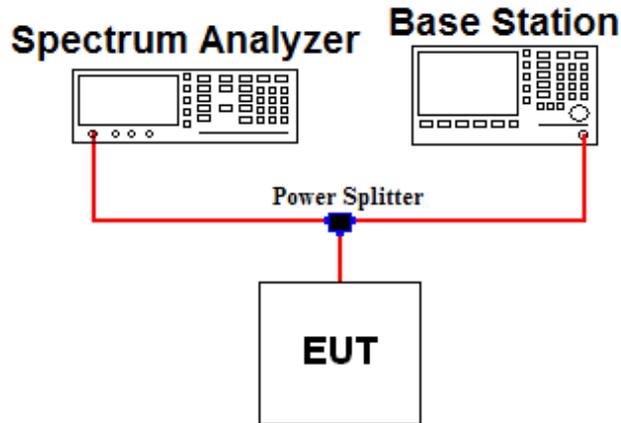


#### *Test Procedure*

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 set-up



#### 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 spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. The Resolution BW of the analyzer is set to 1 % of the emission bandwidth to show compliance with  $-13\text{dBm}$  limit  $[ 43+10\log(P) ]$ , in the 1 MHz bands immediately outside and adjacent to the edge of the frequency block.

A display line was placed at  $-13\text{dBm}$  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.

### 3.5 RADIATED SPURIOUS EMISSIONS

#### Test Set-up



#### Test Procedure

This measurement was performed at 3meter test range. The equipment under test is placed on a wooden turntable 0.8-meters above the ground plane and 3-meters from the receive antenna.

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

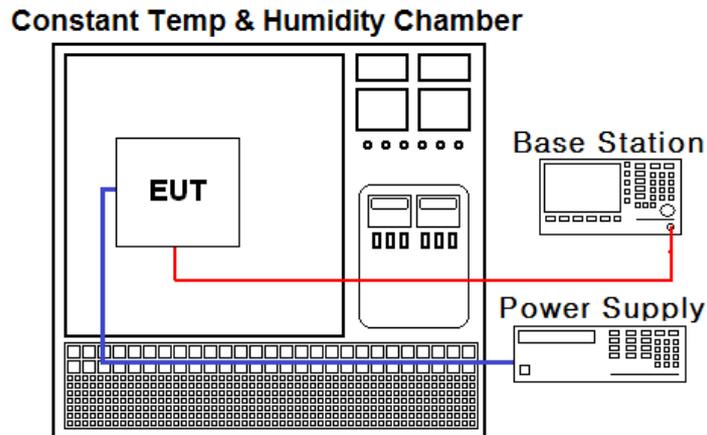
For radiated power measurements below 1GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated power measurements above 1GHz, 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 spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.

This measurement was performed with the EUT oriented in 3 orthogonal axis.

### 3.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

#### Test Set-up



#### Test Procedure

The frequency stability of the transmitter is measured by:

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

Specification - the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency.

#### Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature. (25°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**

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	E4440A	11/09/30	12/09/30	MY45304199
Spectrum Analyzer	Agilent	N9020A	12/01/09	13/01/09	MY49100833
Power Splitter	Anritsu	K241B	11/09/30	12/09/30	020611
TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	11/09/30	12/09/30	30604493/021031
Digital Multimeter	H.P	34401A	11/03/07	12/03/07	3146A13475, US36122178
Signal Generator	Rohde Schwarz	SMR20	11/03/08	12/03/08	101251
Vector Signal Generator	Rohde Schwarz	SMJ100A	12/01/09	13/01/09	100148
8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	11/03/07	12/03/07	GB43461134
Thermo hygrometer	BODYCOM	BJ5478	12/01/13	13/01/13	090205-2
DC Power Supply	HP	6622A	11/03/07	12/03/07	3448A03760
High-pass filter	Wainwright	WHNX2.1	11/09/30	12/09/30	1
High-Pass Filter	Wainwright	D82346	11/09/30	12/09/30	9
Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	32
Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	53
HORN ANT	ETS	3115	11/09/06	12/09/06	21097
HORN ANT	ETS	3115	11/03/22	12/03/22	6419
HORN ANT	Schwarzbeck	BBHA9120A	10/04/13	12/04/13	322
HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154
HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	155
Dipole Antenna	Schwarzbeck	VHA9103	11/11/22	12/11/22	2116
Dipole Antenna	Schwarzbeck	VHA9103	11/11/22	12/11/22	2117
Dipole Antenna	Schwarzbeck	UHA9105	11/11/22	12/11/22	2261
Dipole Antenna	Schwarzbeck	UHA9105	11/11/22	12/11/22	2262
Attenuator (3dB)	WEINSCHL	56-3	11/09/30	12/09/30	Y2342
Attenuator (10dB)	WEINSCHL	23-10-34	11/09/30	12/09/30	BP4386
Attenuator (10dB)	WEINSCHL	31696	11/09/30	12/09/30	446
Amplifier (30dB)	Agilent	8449B	11/03/07	12/03/07	3008A01590
Amplifier	EMPOWER	BBS3Q7ELU	11/09/30	12/09/30	1020
BICONICAL ANT.	Schwarzbeck	VHA 9103	10/12/21	12/12/21	91031946
LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A	10/07/07	12/07/07	590
Amplifier (25dB)	Agilent	8447D	11/03/07	12/03/07	2944A10144

**5. SUMMARY OF TEST RESULTS**

<b>FCC Part Section(s)</b>	<b>Parameter</b>	<b>Status</b> Note 1
2.1046	Conducted Output Power	<b>C</b>
22.913(a) 24.232(c)	Effective Radiated Power Equivalent Isotropic Radiated Power	<b>C</b>
22.917(a) 24.238(a) 2.1049	Occupied Bandwidth	<b>C</b>
22.917(a) 24.238(a) 2.1051	Band Edge Spurious and Harmonic Emissions at Antenna Terminal	<b>C</b>
24.232(d)	Peak to Average Ratio	<b>C</b>
22.917(a) 24.238(a) 2.1053	Radiated Spurious and Harmonic Emissions	<b>C</b>
22.355 24.235 2.1055	Frequency Stability	<b>C</b>
<p>Note 1: <b>C</b>=Comply    <b>NC</b>=Not Comply    <b>NT</b>=Not Tested    <b>NA</b>=Not Applicable</p>		

The sample was tested according to the following specification:  
ANSI/TIA/EIA-603-C-2004

## 6. SAMPLE CALCULATION

### A. Emission Designator

#### GSM850 Emission Designator

Emission Designator = **248KGXW**  
GSM OBW = 247.74kHz  
(Measured at the 99.75% power bandwidth)  
G = Phase Modulation  
X = Cases not otherwise covered  
W = Combination (Audio/Data)

#### GSM1900 Emission Designator

Emission Designator = **248KGXW**  
GSM BW = 247.88kHz  
(Measured at the 99.75% power bandwidth)  
G = Phase Modulation  
X = Cases not otherwise covered  
W = Combination (Audio/Data)

#### EDGE850 Emission Designator

Emission Designator = **245KG7W**  
GSM OBW = 244.84kHz  
(Measured at the 99.75% power bandwidth)  
G = Phase Modulation  
7 = Two or more channels containing  
quantized or digital information  
W = Combination (Audio/Data)

#### EDGE1900 Emission Designator

Emission Designator = **248KG7W**  
GSM OBW = 247.98 kHz  
(Measured at the 99.75% power bandwidth)  
G = Phase Modulation  
7 = Two or more channels containing  
quantized or digital information  
W = Combination (Audio/Data)

#### WCDMA1900 Emission Designator

Emission Designator = **4M08F9W**  
WCDMA OBW = 4.0797MHz  
(Measured at the 99.75% power bandwidth)  
F = Frequency Modulation  
9 = Composite Digital Information  
W = Combination (Audio/Data)

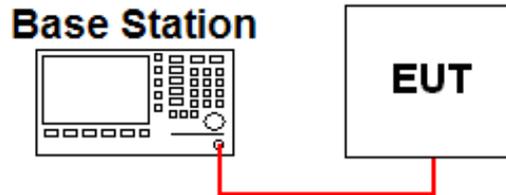
#### HSUPA1900 Emission Designator

Emission Designator = **4M09F9W**  
HSUPA OBW = 4.0889MHz  
(Measured at the 99.75% power bandwidth)  
F = Frequency Modulation  
9 = Composite Digital Information  
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.



#### ▪ GSM / GPRS / EDGE

Band	Channel	Test Result(dBm)								
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	33.2	33.2	31.8	30.2	29.4	27.5	27.5	26.6	25.4
	190	33.2	33.2	31.8	30.3	29.3	27.4	27.4	26.6	25.4
	251	33.2	33.1	31.7	30.3	29.3	27.5	27.4	26.5	25.3
PCS	512	30.2	30.2	30.1	29.5	28.2	26.5	26.5	25.3	24.1
	661	30.2	30.2	30.2	29.4	28.1	26.5	26.5	25.3	24.0
	810	30.2	30.1	30.1	29.4	28.1	26.5	26.4	25.2	24.1

The power was measured E5515C

#### ▪ WCDMA

3GPP Release Version	Mode		Power (dBm)			MPR	B <sub>c</sub>	β <sub>d</sub>	B <sub>c</sub> /β <sub>d</sub>	Sub-Test
	Channel		4132	4183	4233					
99	WCDMA	RMC	N/A	N/A	N/A	-	-	-	-	-
		ARM								
5	HSDPA (Cellular)		N/A	N/A	N/A	0	2/15	15/15	2/15	1
5			N/A	N/A	N/A	0	12/15	15/15	12/15	2
5			N/A	N/A	N/A	0.5	15/15	8/15	15/8	3
5			N/A	N/A	N/A	0.5	15/15	4/15	15/4	4
-	Channel		<b>9262</b>	<b>9400</b>	<b>9538</b>	-	-	-	-	-
99	WCDMA	RMC	23.08	22.95	22.94	-	-	-	-	-
		ARM	23.05	22.89	22.91					
5	HSDPA (PCS)		22.99	22.89	22.85	0	2/15	15/15	2/15	1
5			22.90	22.79	22.81	0	12/15	15/15	12/15	2
5			22.39	22.35	22.33	0.5	15/15	8/15	15/8	3
5			22.33	22.25	22.26	0.5	15/15	4/15	15/4	4

The power was measured E5515C

## ▪ HSUPA

3GPP Release Version	Mode	Power (dBm)			MPR	Bc	$\beta$ d	Bc/ $\beta$ d	Sub-Test
	Channel	4132	4183	4233					
6	<b>HSUPA (Cellular)</b>	N/A	N/A	N/A	0	11/15	15/15	11/15	1
6		N/A	N/A	N/A	2	6/15	15/15	6/15	2
6		N/A	N/A	N/A	1	15/15	9/15	15/9	3
6		N/A	N/A	N/A	2	2/15	15/15	2/15	4
6		N/A	N/A	N/A	0	15/15	15/15	15/15	5
-	<b>Channel</b>	<b>9262</b>	<b>9400</b>	<b>9538</b>	-	-	-	-	-
6	<b>HSUPA (PCS)</b>	23.06	22.83	22.85	0	11/15	15/15	11/15	1
6		21.24	21.04	21.13	2	6/15	15/15	6/15	2
6		21.96	21.71	21.98	1	15/15	9/15	15/9	3
6		21.13	20.74	20.86	2	2/15	15/15	2/15	4
6		22.91	22.75	22.81	0	15/15	15/15	15/15	5

The power was measured E5515C

**7.2 PEAK TO AVERAGE RATIO**

- Plots of the EUT's Peak- to- Average Ratio are shown in Clause 8.1

**7.3 OCCUPIED BANDWIDTH**

Band	Channel	Test Result(KHz)
GSM850	128	246.26
	190	247.74
	251	246.31
GSM1900	512	247.88
	661	243.11
	810	247.02
EDGE850	128	244.84
	190	244.28
	251	243.71
EDGE1900	512	247.98
	661	247.44
	810	253.09
WCDMA1900	9262	4049.40
	9400	4079.70
	9538	4065.80
HSUPA1900	9262	4060.50
	9400	4088.90
	9538	4071.30

- Plots of the EUT's Occupied Bandwidth are shown in Clause 8.2

**7.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL**

- Plots of the EUT's Conducted Spurious Emissions are shown in Clause 8.3

**7.5 BAND EDGE**

- Plots of the EUT's Band Edge are shown in Clause 8.4

**7.6 EFFECTIVE RADIATED POWER(GSM850)****- GSM850 data**

Channel	EUT Position (Axis)	TEST CONDITIONS			Power Step: 5		
		Ref. level (dBm)	Pol. (H/V)	ERP (dBm)	ERP (W)	Power Supply	Note.
128	X	-0.19	H	32.53	1.789	DC 3.7V	GSM
190	X	-0.64	H	33.36	2.168	DC 3.7V	GSM
251	Y	-4.07	V	32.07	1.611	DC 3.7V	GSM
251	X	-4.84	H	29.16	0.824	DC 3.7V	EDGE

**NOTES:**

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

The EUT is placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation is 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 is substituted in place of the EUT. This dipole antenna is driven by a signal generator and the level of the signal generator is 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 EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.

The worst case data is reported.

**7.7 EQUIVALENT ISOTROPIC RADIATED POWER(GSM1900/ WCDMA1900)****- GSM1900 data**

Channel	EUT Position (Axis)	TEST CONDITIONS						Note
		Ref. level (dBm)	Pol. (H/V)	Ant Gain (dBi)	EIRP (dBm)	EIRP (W)	Power Supply	
512	Z	-13.76	V	8.59	24.54	0.284	DC 3.7V	GSM
661	Y	-15.90	V	8.68	22.88	0.194	DC 3.7V	GSM
810	Y	-15.61	V	8.77	22.81	0.191	DC 3.7V	GSM
810	Z	-17.77	V	8.59	20.53	0.113	DC 3.7V	EDGE

**- WCDMA1900 data**

Channel	EUT Position (Axis)	TEST CONDITIONS						
		Ref. level (dBm)	Pol. (H/V)	Ant Gain (dBi)	EIRP (dBm)	EIRP (W)	Power Supply	Note
9262	Z	-18.83	V	8.60	19.48	0.089	DC 3.7V	-
9400	X	-18.10	H	8.68	18.92	0.078	DC 3.7V	-
9538	X	-15.61	H	8.77	20.45	0.111	DC 3.7V	-

**- HSUPA1900 data**

Channel	EUT Position (Axis)	TEST CONDITIONS						
		Ref. level (dBm)	Pol. (H/V)	Ant Gain (dBi)	EIRP (dBm)	EIRP (W)	Power Supply	Note
9262	Z	-18.27	V	8.60	20.04	0.101	DC 3.7V	-
9400	Z	-18.38	V	8.68	20.40	0.110	DC 3.7V	-
9538	X	-15.85	H	8.77	20.21	0.105	DC 3.7V	-

**NOTES:**

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

The EUT is placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation is 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 is substituted in place of the EUT. This dipole antenna is driven by a signal generator and the level of the signal generator is 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 EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna. The worst case data is reported.

## 7.8 RADIATED SPURIOUS EMISSIONS

### 7.8.1 RADIATED SPURIOUS EMISSIONS (GSM850)

Channel (ERP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	(dBc)	Limit (dBc)
128 (1.789W)	1648.22	Z	V	-54.75	5.31	-49.44	81.97	45.53
	2472.50	X	H	-56.06	6.86	-49.20	81.73	
	-	-	-	-	-	-	-	
190 (2.168W)	1673.11	X	H	-59.63	5.37	-54.26	87.62	46.36
	2510.01	Z	V	-53.06	6.91	-46.15	79.51	
	-	-	-	-	-	-	-	
251 (1.611W)	1697.31	X	H	-61.51	5.43	-56.08	88.15	45.07
	2545.70	X	H	-55.85	6.97	-48.88	80.95	
	-	-	-	-	-	-	-	

- Limit Calculation =  $43 + 10 \log_{10} (\text{ERP [W]})$  [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

#### NOTES:

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

The EUT is placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation is adjusted for the highest reading on the receive spectrum analyzer.

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. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

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 EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.

The worst case data is reported.

**7.8.2 RADIATED SPURIOUS EMISSIONS (GSM1900)**

Channel (EIRP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	(dBc)	Limit (dBc)
512 (0.284W)	5550.73	Y	H	-52.43	11.22	-41.21	65.75	37.54
	7400.85	Y	H	-44.32	11.76	-32.56	57.10	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
661 (0.194W)	5639.74	Y	H	-57.06	11.27	-45.79	68.67	35.88
	7520.24	Z	V	-49.55	11.71	-37.84	60.72	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
810 (0.191W)	5729.34	Y	H	-54.53	11.33	-43.20	66.01	35.81
	7638.90	Z	V	-46.16	11.66	-34.50	57.31	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation =  $43 + 10 \log_{10} ( \text{EIRP [W]} )$  [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

**NOTES:**

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

The EUT is placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation is adjusted for the highest reading on the receive spectrum analyzer.

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. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

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 EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.

The worst case data is reported.

**7.8.3 RADIATED SPURIOUS EMISSIONS (WCDMA1900)**

Channel (EIRP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	(dBc)	Limit (dBc)
9262 (0.089W)	5562.27	X	H	-53.42	9.67	-43.75	63.23	32.48
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9400 (0.078W)	5642.31	X	H	-53.80	9.68	-44.12	63.04	31.92
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9538 (0.111W)	5720.86	X	H	-53.46	9.69	-43.77	64.22	33.45
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation =  $43 + 10 \log_{10} ( \text{ERP [W]} )$  [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

**NOTES:**

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

The EUT is placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation is adjusted for the highest reading on the receive spectrum analyzer.

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. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

This device was tested under all configurations and the highest power is reported.

This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.

The worst case data is reported.

**7.8.4 RADIATED SPURIOUS EMISSIONS (HSUPA1900)**

Channel (ERP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	(dBc)	Limit (dBc)
9262 (0.101W)	5561.98	X	H	-53.10	9.67	-43.43	63.47	33.04
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9400 (0.110W)	5638.92	X	H	-53.74	9.68	-44.06	64.46	33.40
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9538 (0.105W)	5562.27	X	H	-53.58	9.69	-43.89	64.10	33.21
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation =  $43 + 10 \log_{10} ( \text{ERP [W]} )$  [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

**NOTES:**

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

The EUT is placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation is adjusted for the highest reading on the receive spectrum analyzer.

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. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

This device was tested under all configurations and the highest power is reported.

This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.

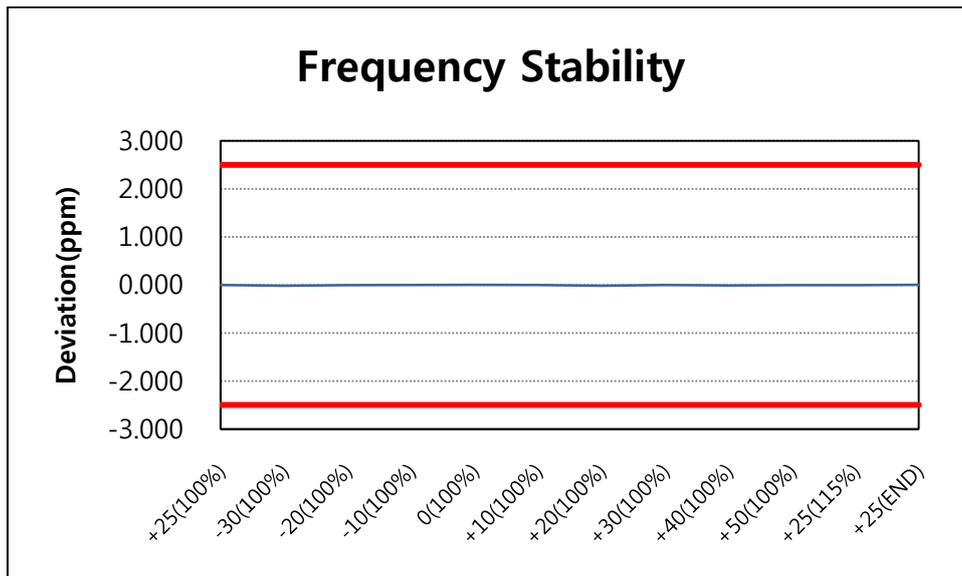
The worst case data is reported.

### 7.9 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

#### 7.9.1 FREQUENCY STABILITY (GSM850)

OPERATING FREQUENCY : 836,600,007 Hz  
 CHANNEL : 190(Mid)  
 REFERENCE VOLTAGE : 3.70 V DC  
 DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

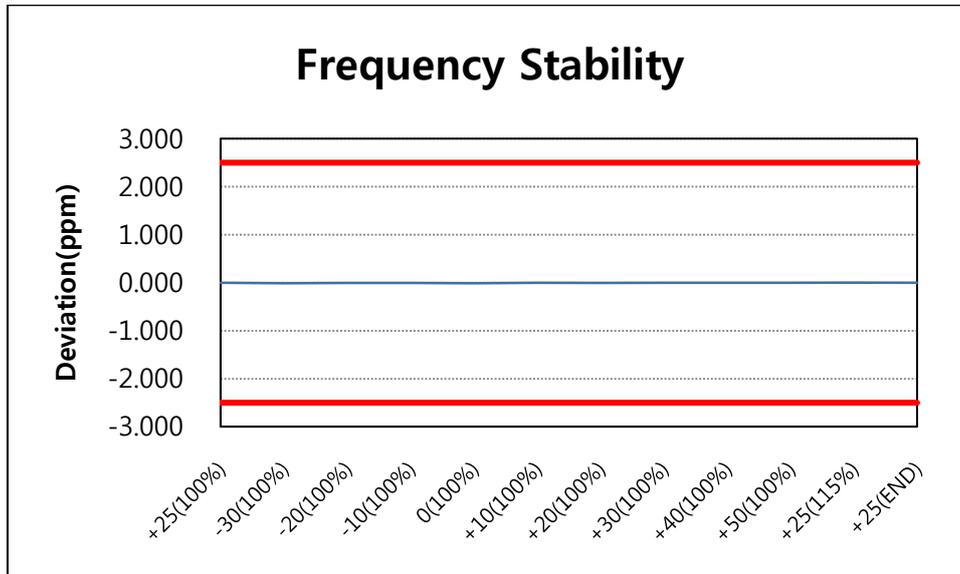
VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation	
				(ppm)	(%)
100%	3.700	+25(Ref)	836,600,007	0.000	0.00000000
100%		-30	836,599,994	-0.016	-0.00000155
100%		-20	836,600,004	-0.004	-0.00000036
100%		-10	836,600,006	-0.001	-0.00000012
100%		0	836,600,009	0.002	0.00000024
100%		+10	836,600,006	-0.001	-0.00000012
100%		+20	836,599,993	-0.017	-0.00000167
100%		+30	836,600,008	0.001	0.00000012
100%		+40	836,599,997	-0.012	-0.00000120
100%		+50	836,600,005	-0.002	-0.00000024
115%	4.255	+25	836,600,005	-0.002	-0.00000024
BATT.ENDPOINT	3.300	+25	836,600,010	0.004	0.00000036



**7.9.2 FREQUENCY STABILITY (GSM1900)**

OPERATING FREQUENCY : 1,880,000,011 Hz  
 CHANNEL : 661(Mid)  
 REFERENCE VOLTAGE : 3.70 V DC  
 DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

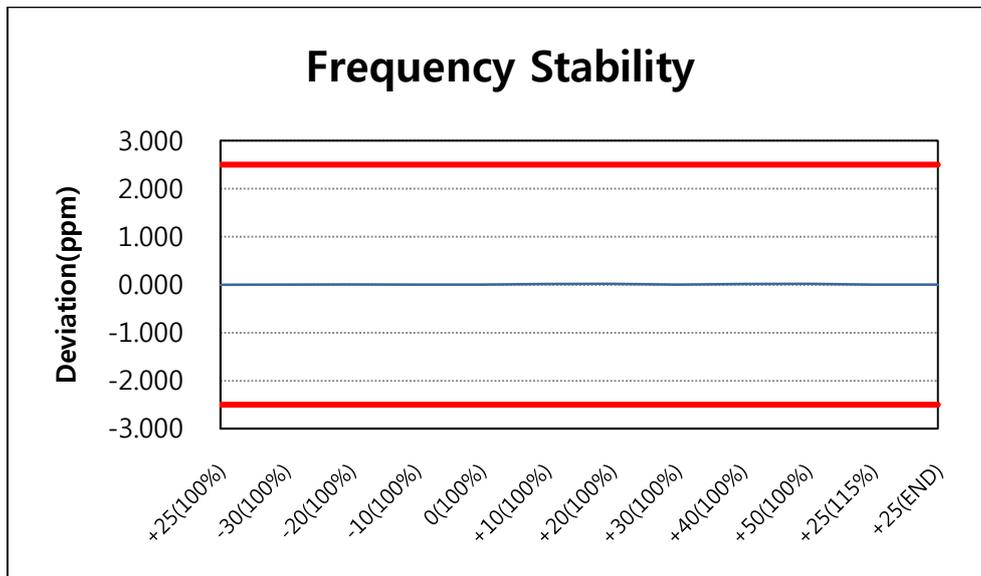
VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation	
				(ppm)	(%)
100%	3.700	+25(Ref)	1,880,000,011	0.000	0.00000000
100%		-30	1,879,999,990	-0.011	-0.00000112
100%		-20	1,880,000,007	-0.002	-0.00000021
100%		-10	1,880,000,005	-0.003	-0.00000032
100%		0	1,879,999,993	-0.010	-0.00000096
100%		+10	1,880,000,009	-0.001	-0.00000011
100%		+20	1,880,000,006	-0.003	-0.00000027
100%		+30	1,880,000,010	-0.001	-0.00000005
100%		+40	1,880,000,012	0.001	0.00000005
100%		+50	1,880,000,008	-0.002	-0.00000016
115%	4.255	+25	1,880,000,016	0.003	0.00000027
BATT.ENDPOINT	3.300	+25	1,880,000,011	0.000	0.00000000



**7.9.3 FREQUENCY STABILITY (WCDMA1900)**

OPERATING FREQUENCY : 1,879,999,983 Hz  
 CHANNEL : 9400(Mid)  
 REFERENCE VOLTAGE : 3.70 V DC  
 DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

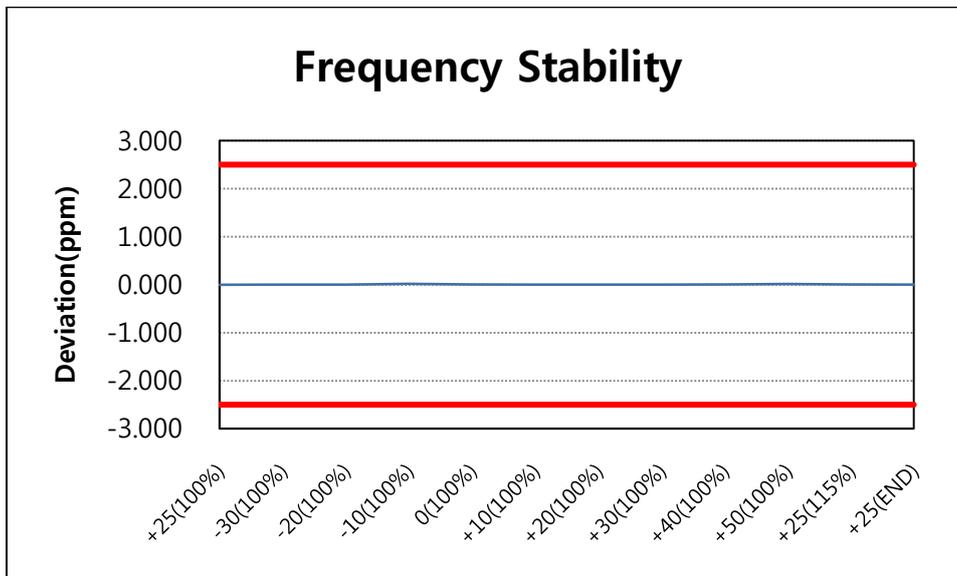
VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation	
				(ppm)	(%)
100%	3.700	+25(Ref)	1,879,999,983	0.000	0.00000000
100%		-30	1,879,999,989	0.003	0.00000032
100%		-20	1,879,999,992	0.005	0.00000048
100%		-10	1,879,999,990	0.004	0.00000037
100%		0	1,879,999,988	0.003	0.00000027
100%		+10	1,880,000,016	0.018	0.00000176
100%		+20	1,880,000,019	0.019	0.00000191
100%		+30	1,879,999,987	0.002	0.00000021
100%		+40	1,880,000,015	0.017	0.00000170
100%		+50	1,880,000,019	0.019	0.00000191
115%		4.255	+25	1,879,999,990	0.004
BATT.ENDPOINT	3.300	+25	1,879,999,988	0.003	0.00000027



**7.9.4 FREQUENCY STABILITY (HSUPA1900)**

OPERATING FREQUENCY : 1,879,999,981 Hz  
 CHANNEL : 9400(Mid)  
 REFERENCE VOLTAGE : 3.70 V DC  
 DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

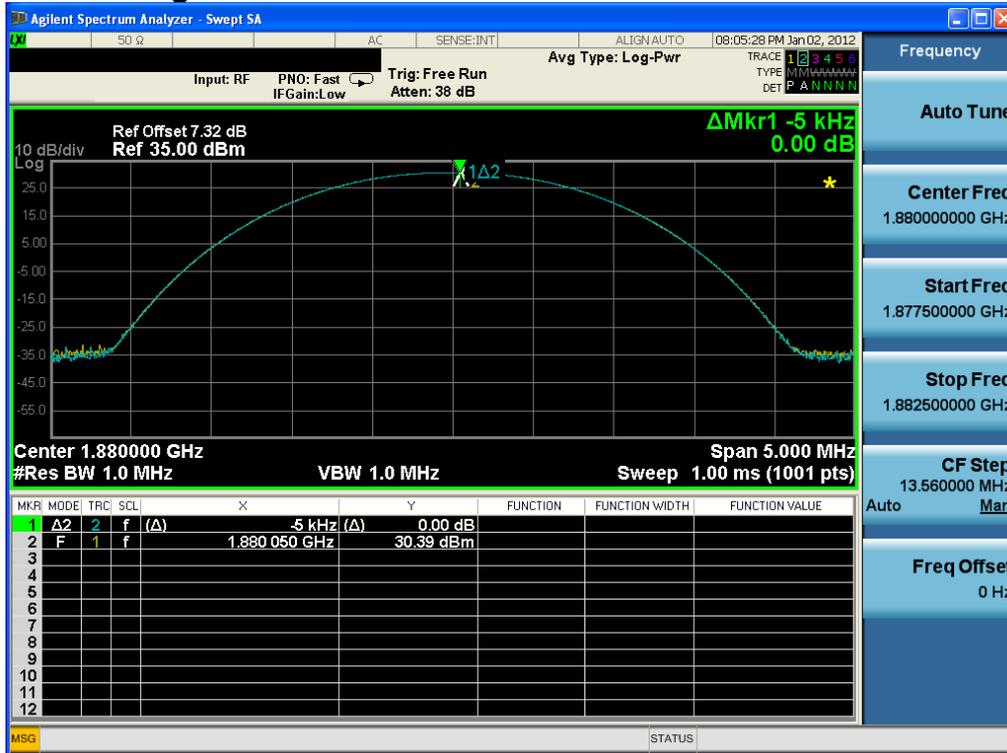
VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation	
				(ppm)	(%)
100%	3.700	+25(Ref)	1,879,999,981	0.000	0.00000000
100%		-30	1,879,999,985	0.002	0.00000021
100%		-20	1,879,999,987	0.003	0.00000032
100%		-10	1,880,000,016	0.019	0.00000186
100%		0	1,879,999,992	0.006	0.00000059
100%		+10	1,879,999,986	0.003	0.00000027
100%		+20	1,879,999,988	0.004	0.00000037
100%		+30	1,879,999,989	0.004	0.00000043
100%		+40	1,879,999,993	0.006	0.00000064
100%		+50	1,880,000,010	0.015	0.00000154
115%		4.255	+25	1,879,999,991	0.005
BATT.ENDPOINT	3.300	+25	1,879,999,987	0.003	0.00000032



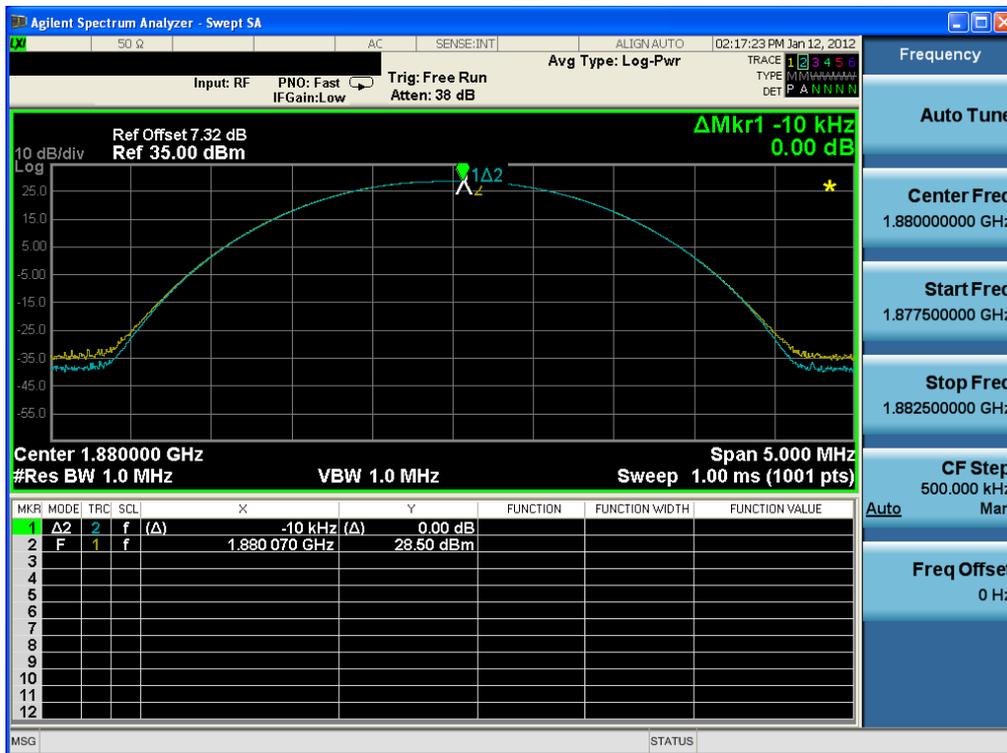
## 8. TEST PLOTS

### 8.1 Peak to Average Ratio

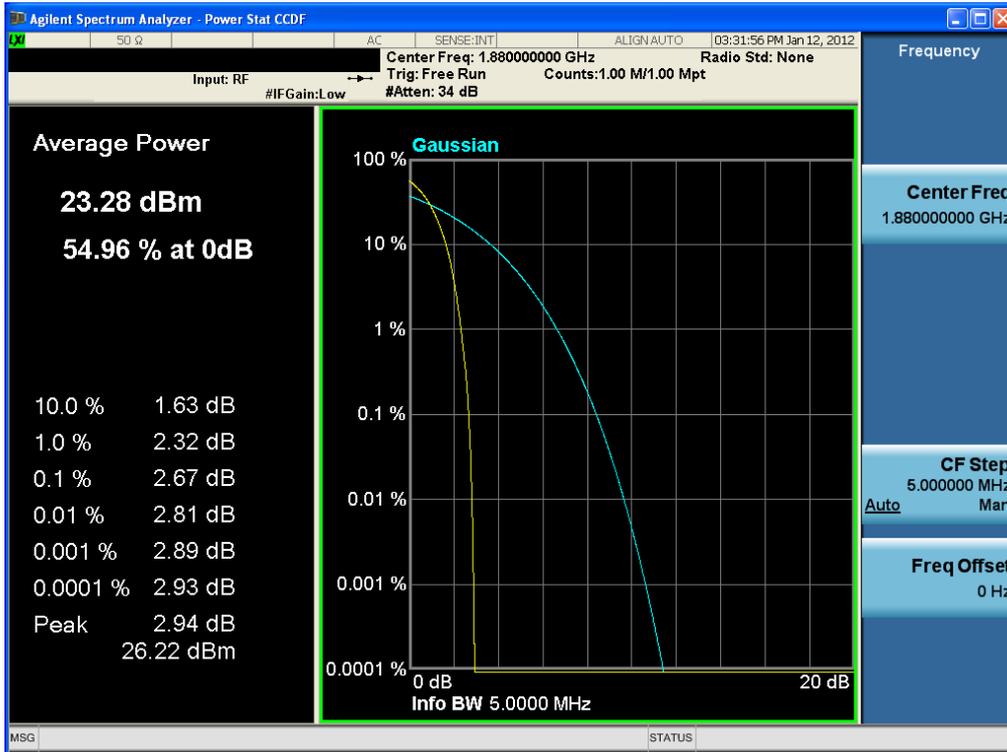
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### EDGE1900 & Channel: 661

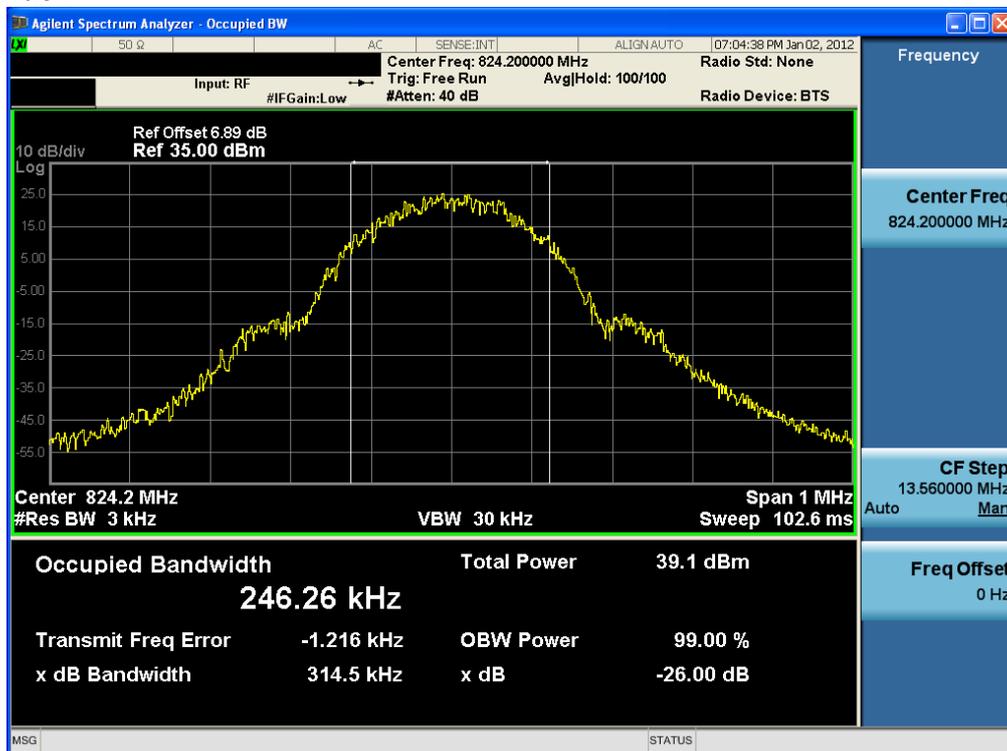


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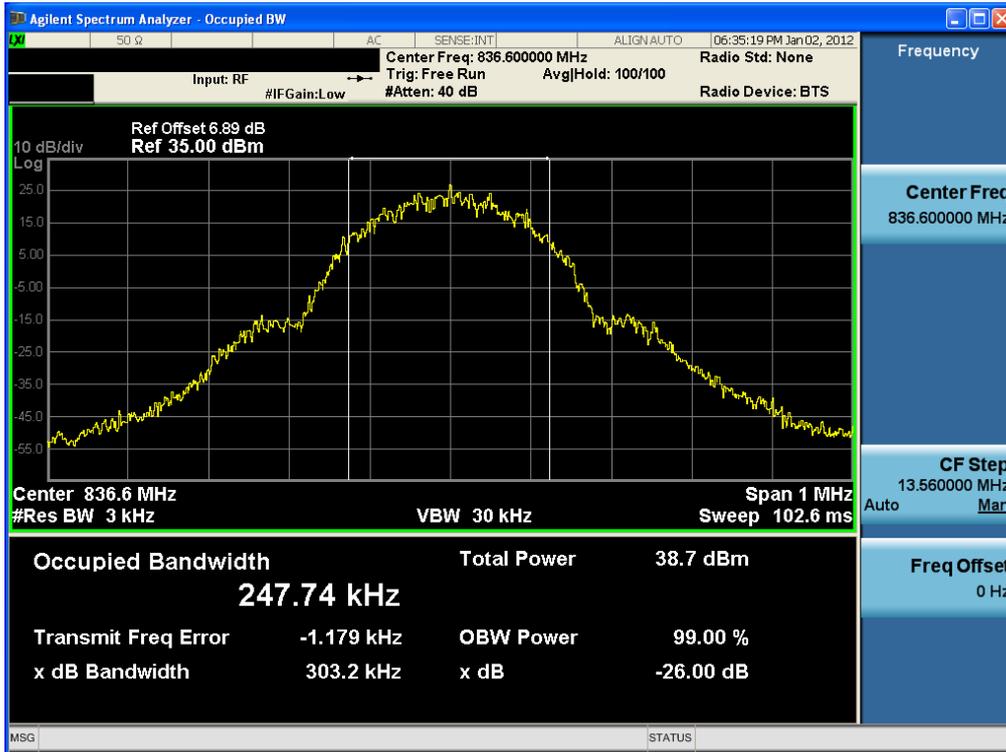


8.2 Occupied Bandwidth 99 % Bandwidth

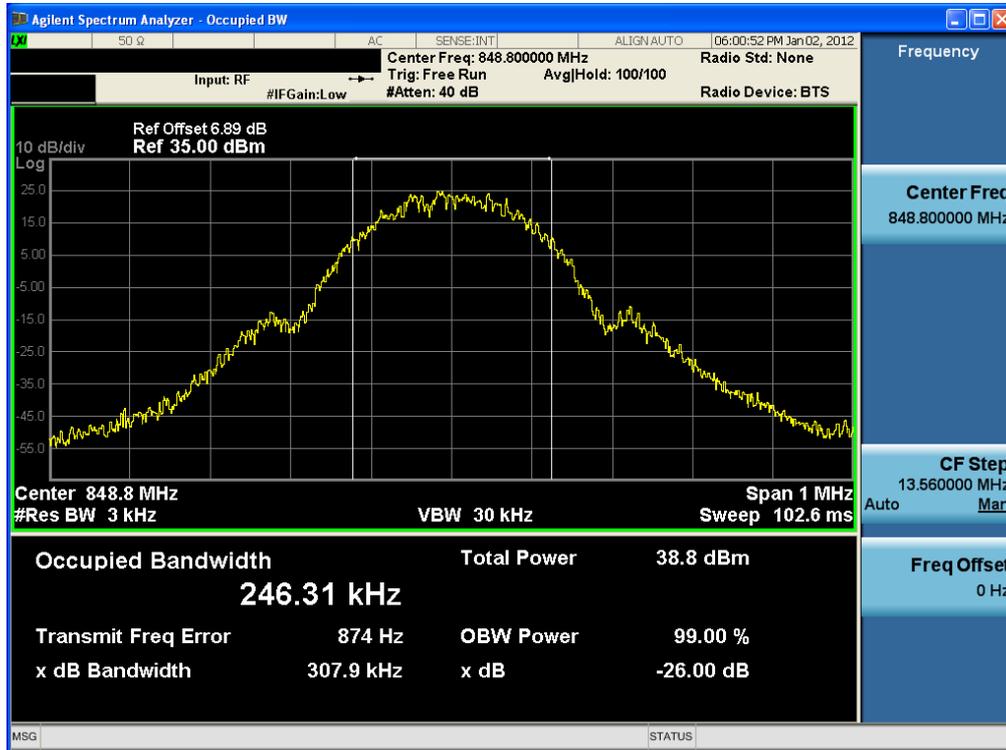
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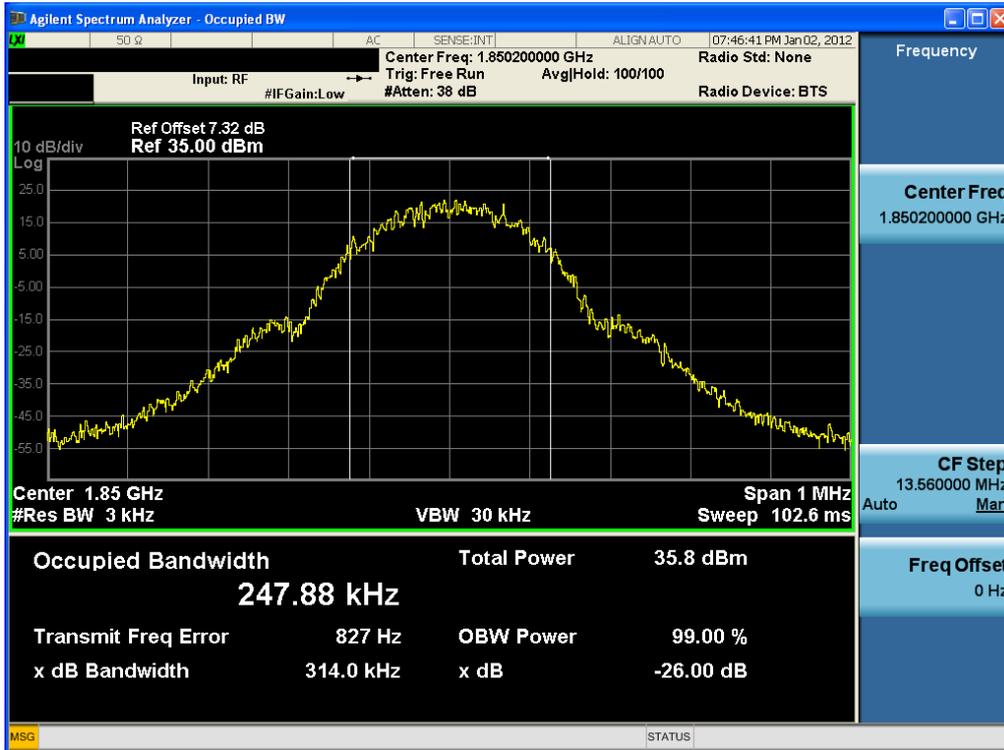
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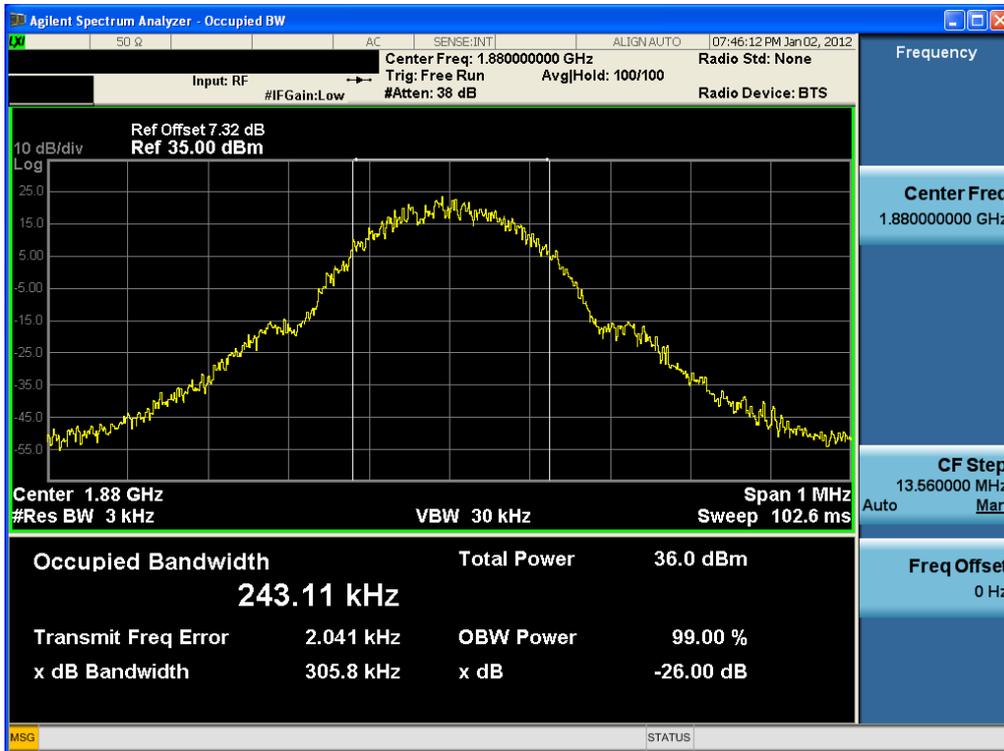
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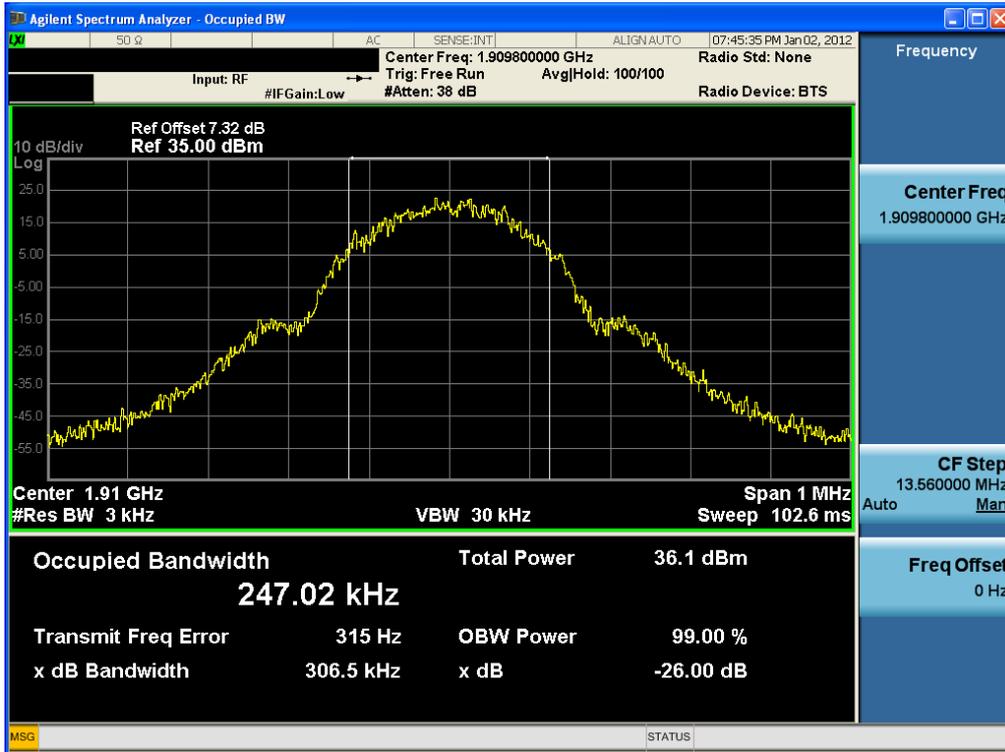
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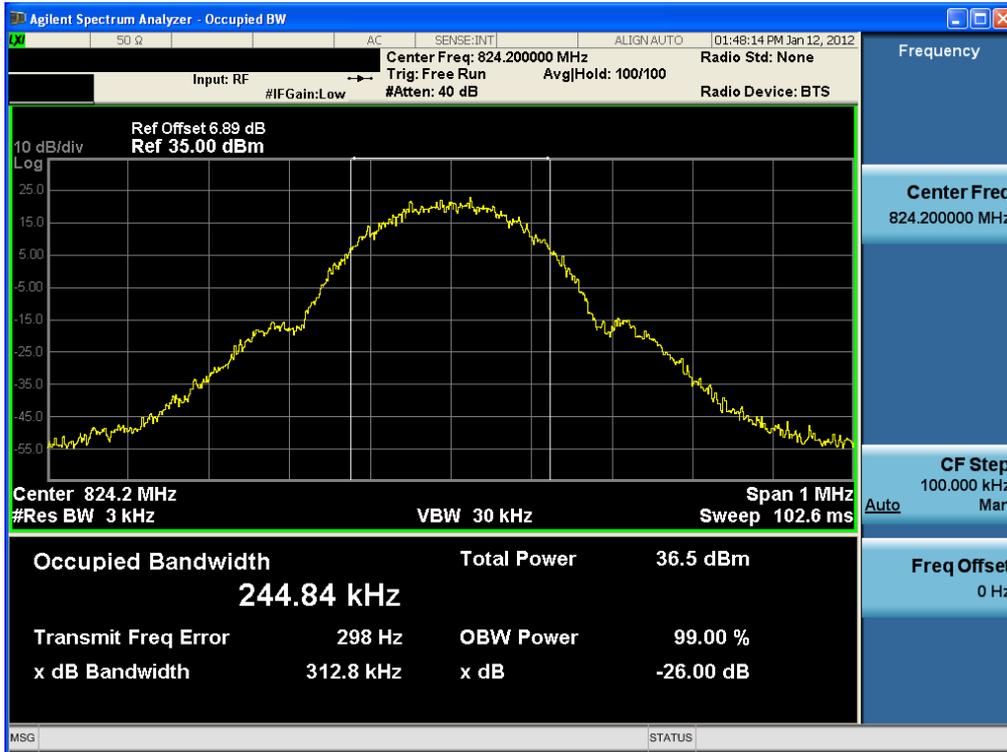
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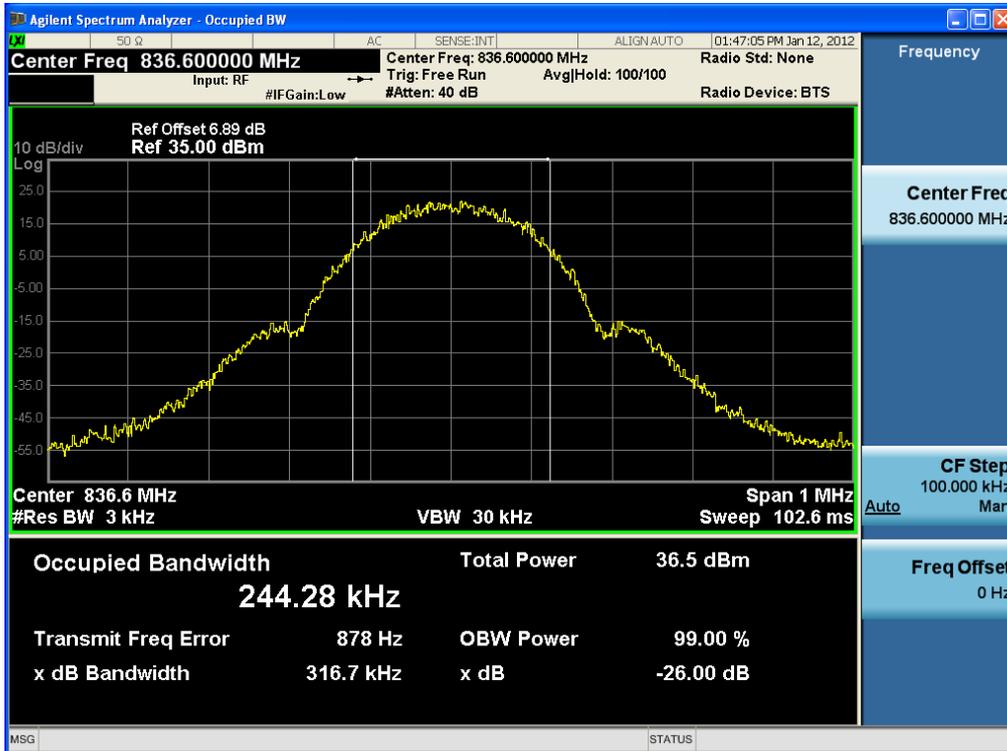
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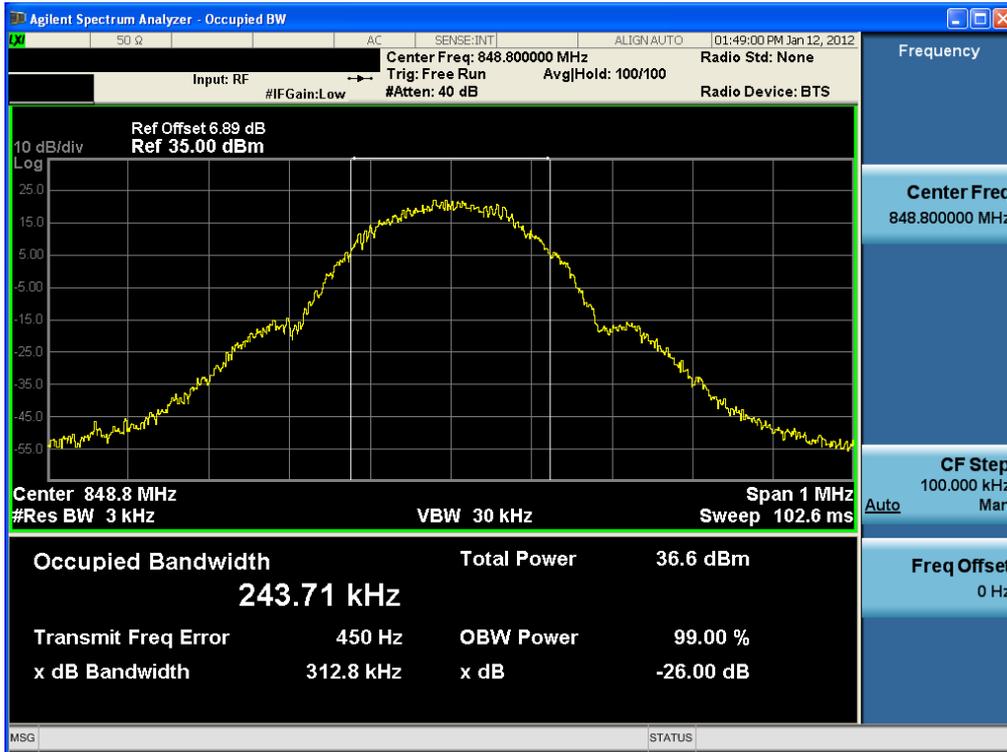
EDGE 850 & Channel: 128



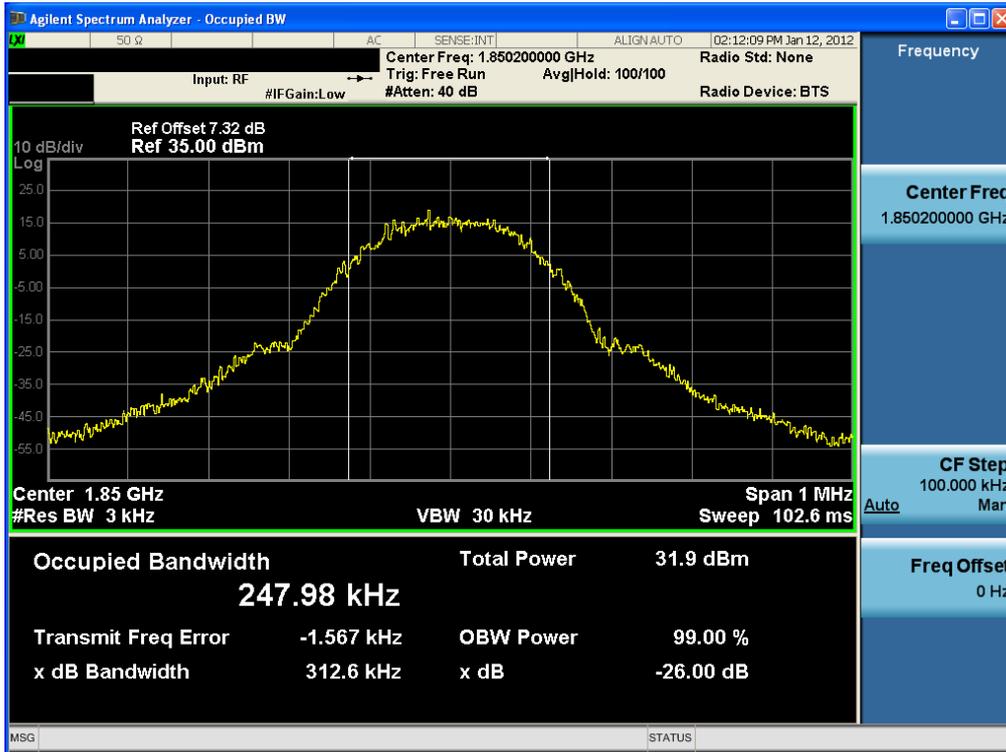
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### EDGE 850 & Channel: 251



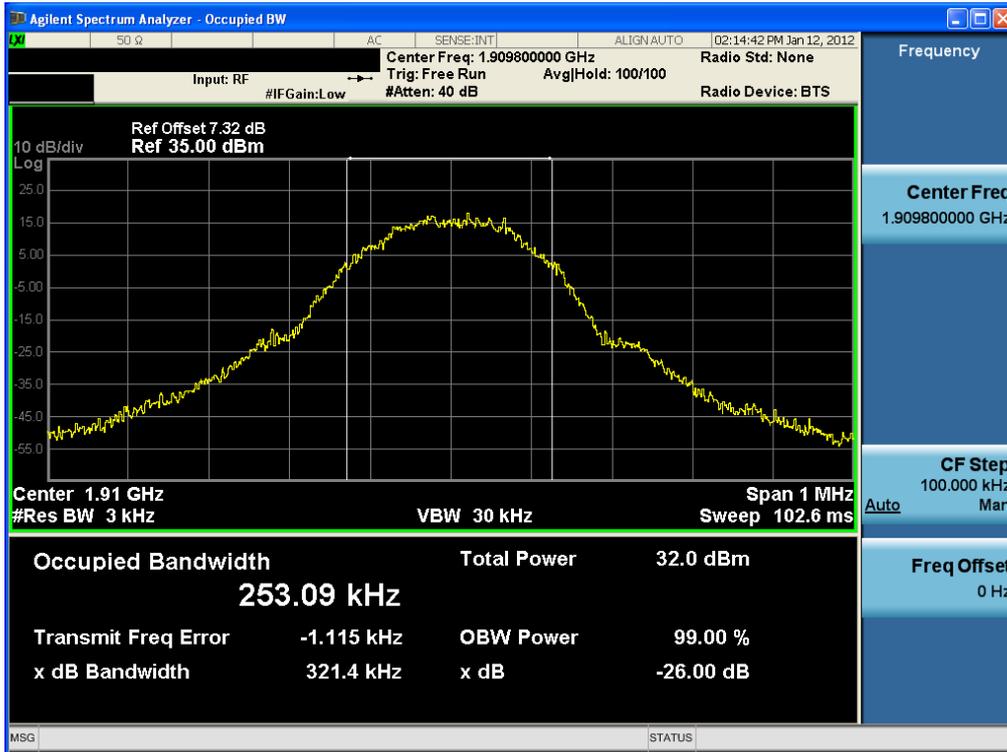
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EDGE 1900 & Channel: 661



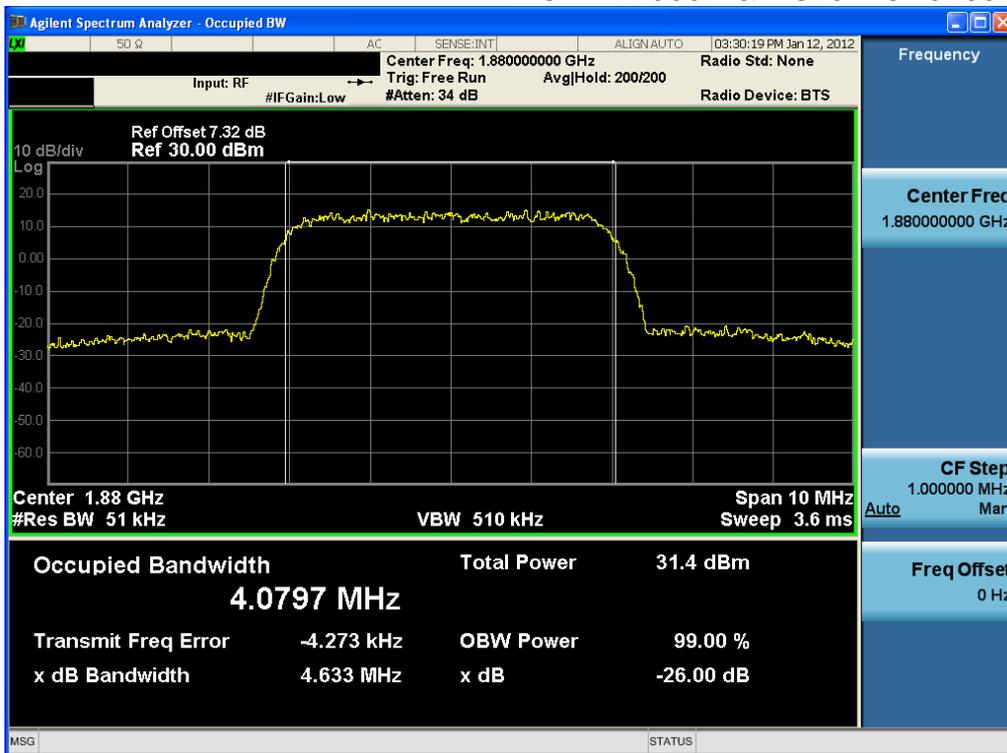
EDGE 1900 & Channel: 810



WCDMA1900 & Channel: 9262



WCDMA1900 & Channel: 9400



WCDMA1900 & Channel: 9538



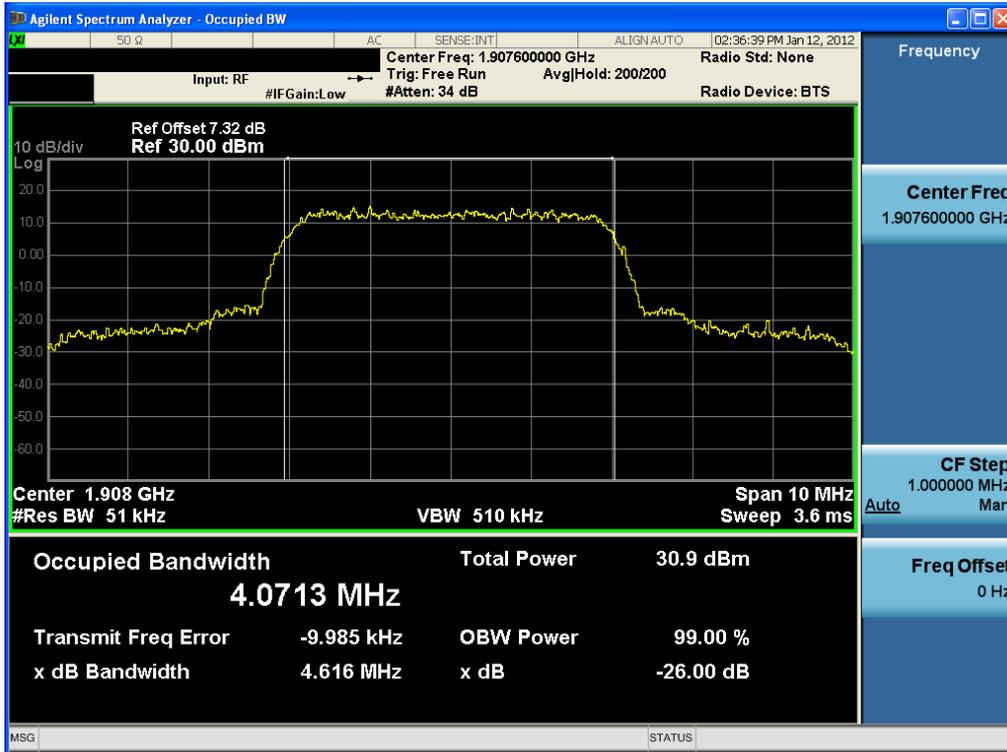
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HSUPA1900 & Channel: 9400

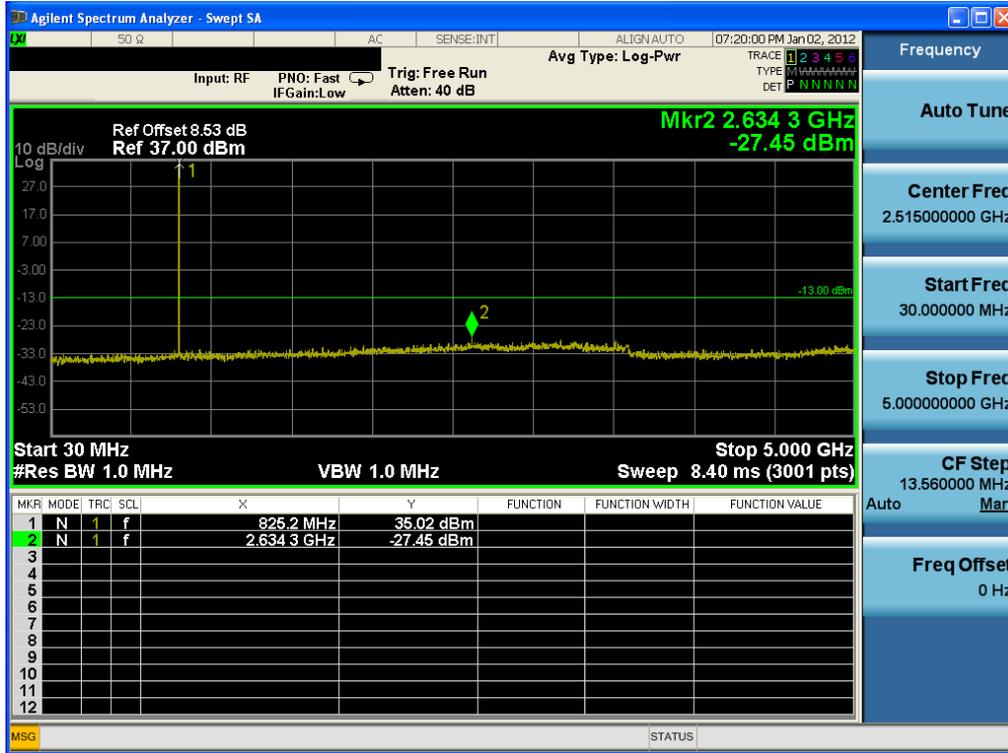


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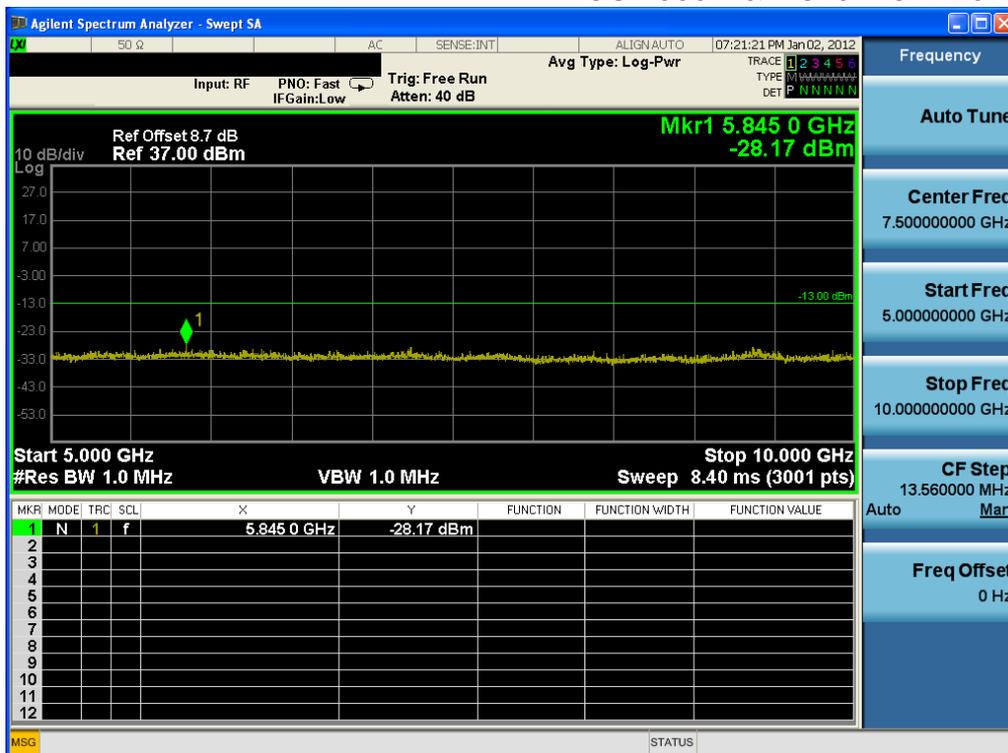


### 8.3 Spurious Emissions at Antenna Terminal

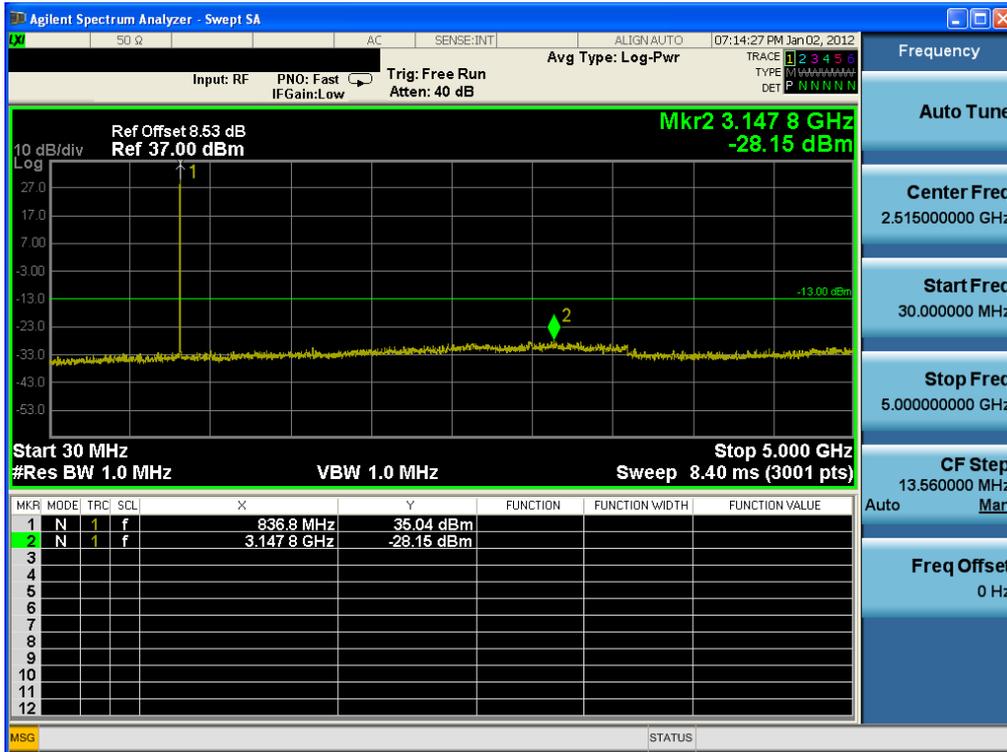
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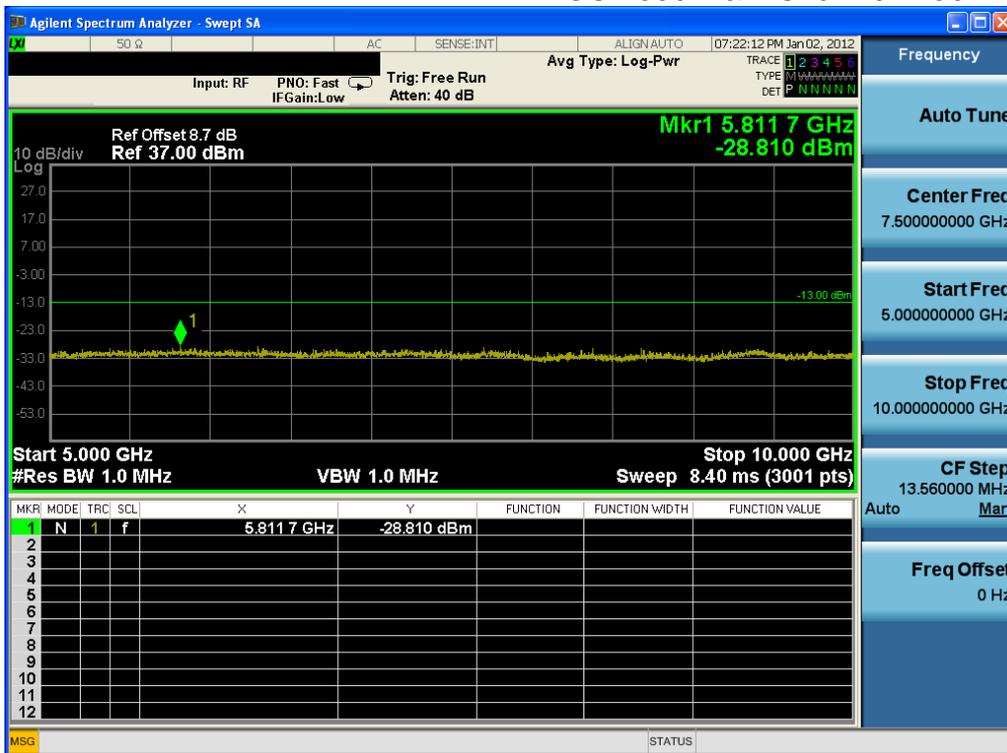
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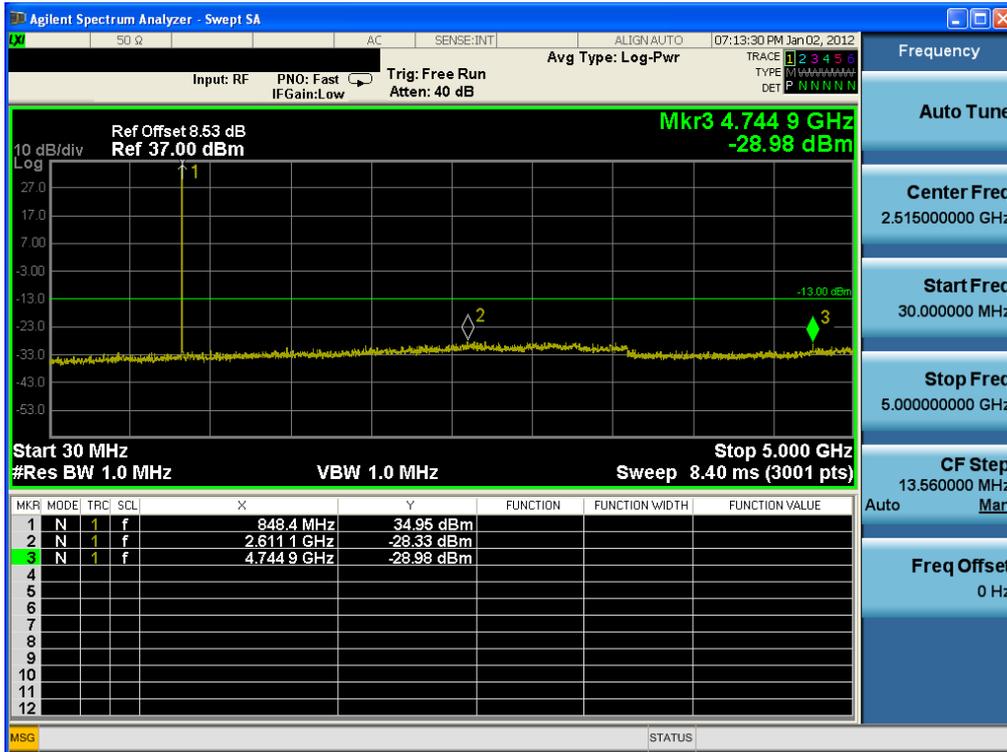
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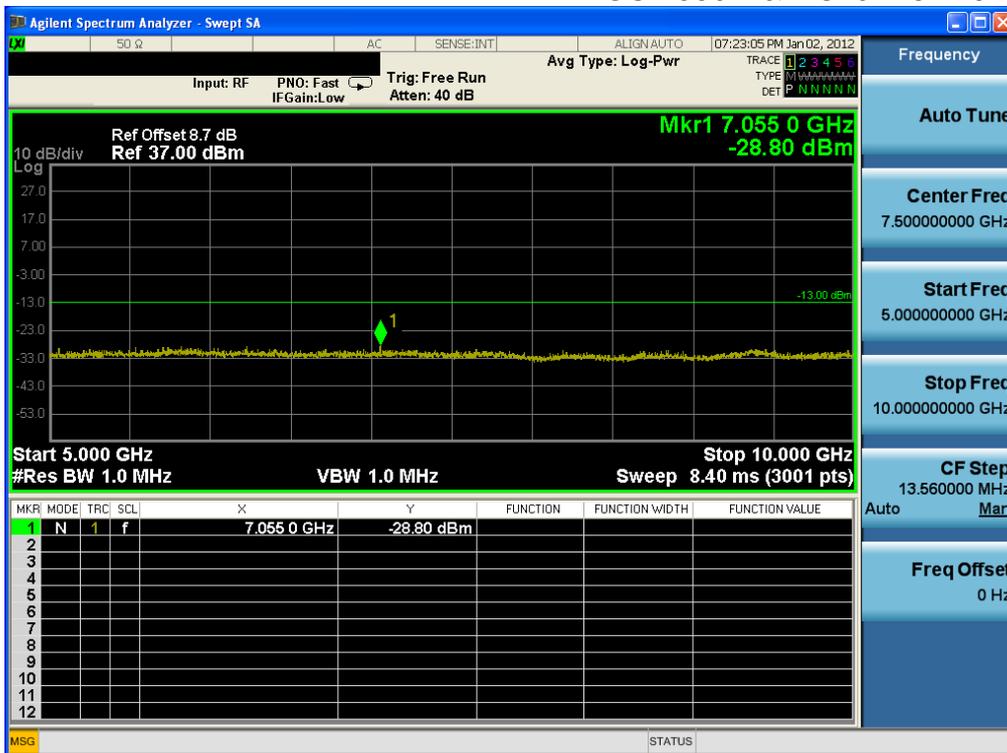
GSM850 & Channel: 190



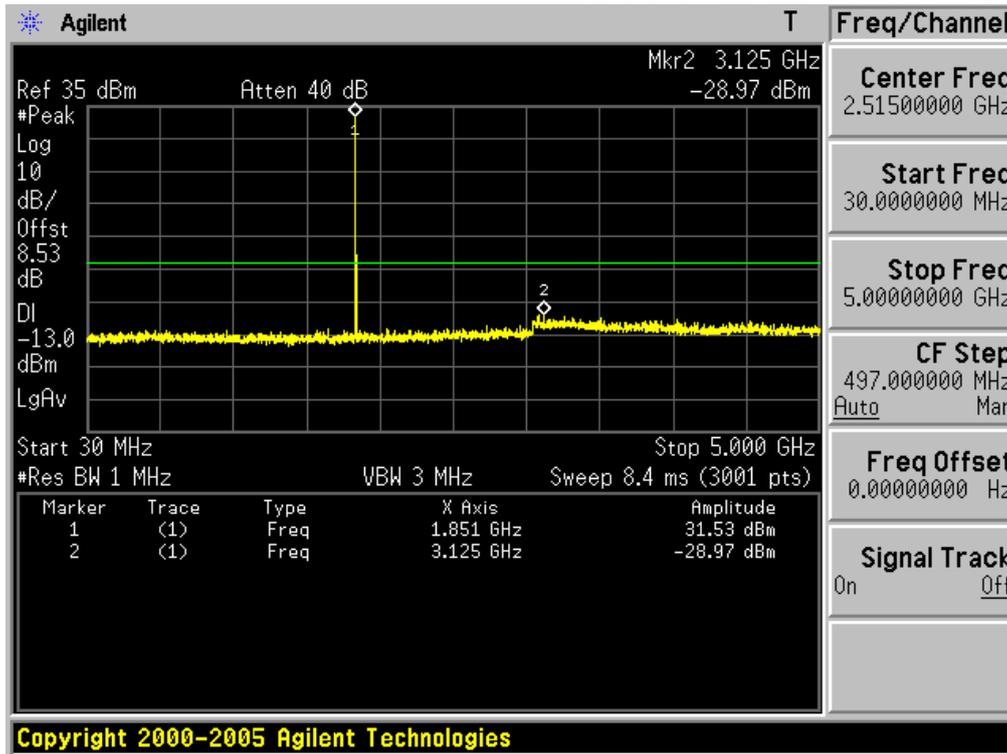
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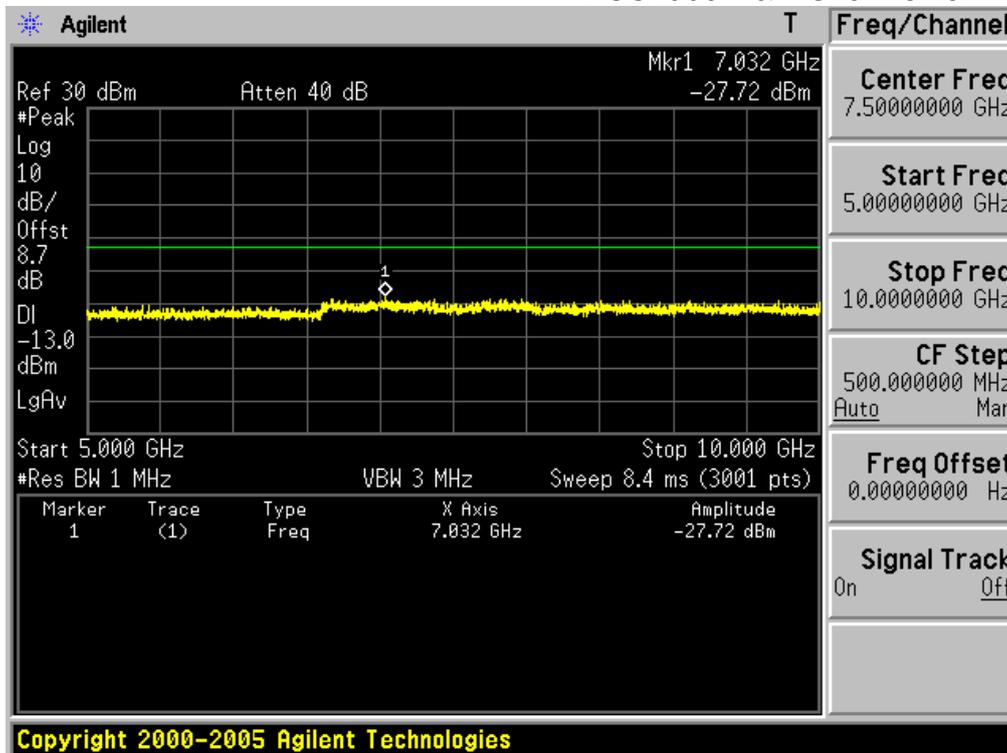
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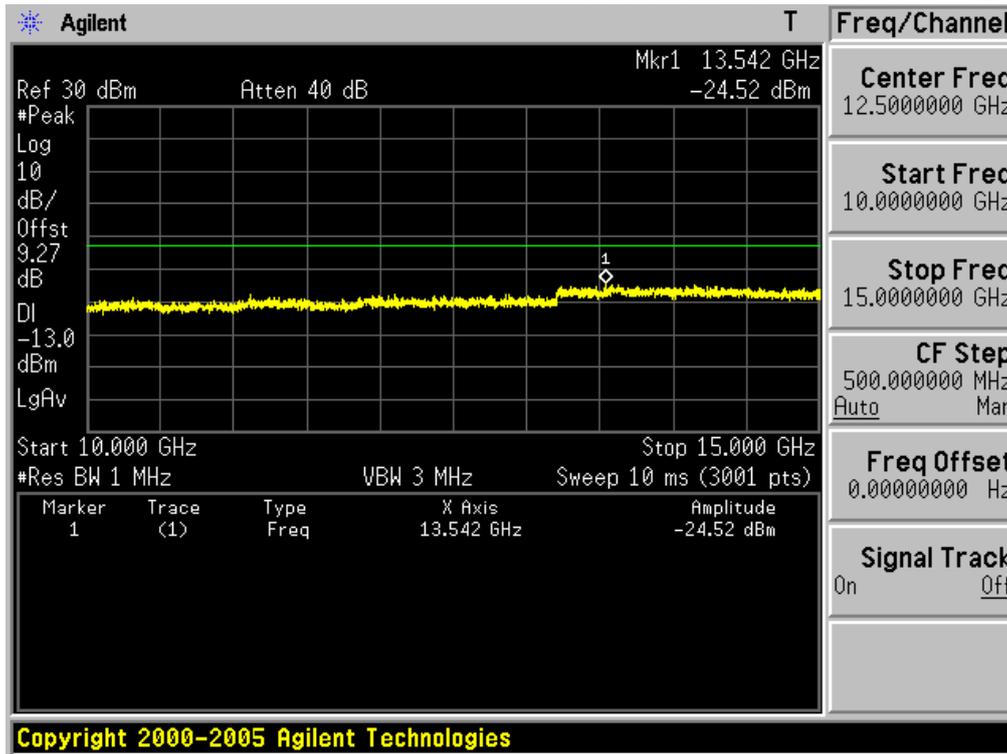
PCS1900 & Channel: 512



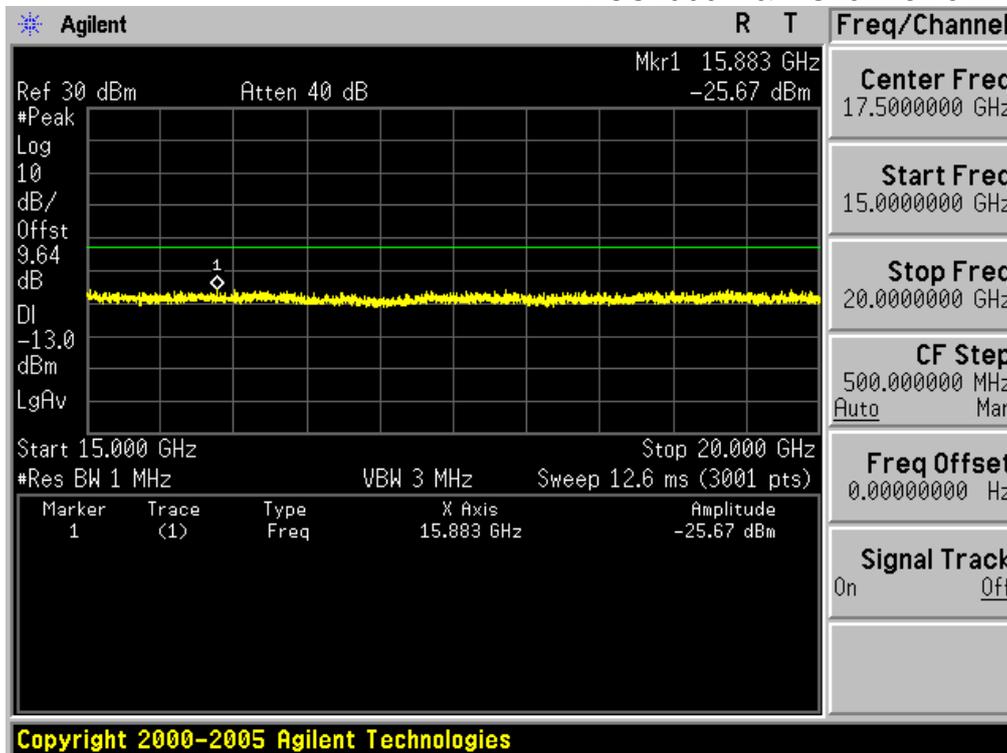
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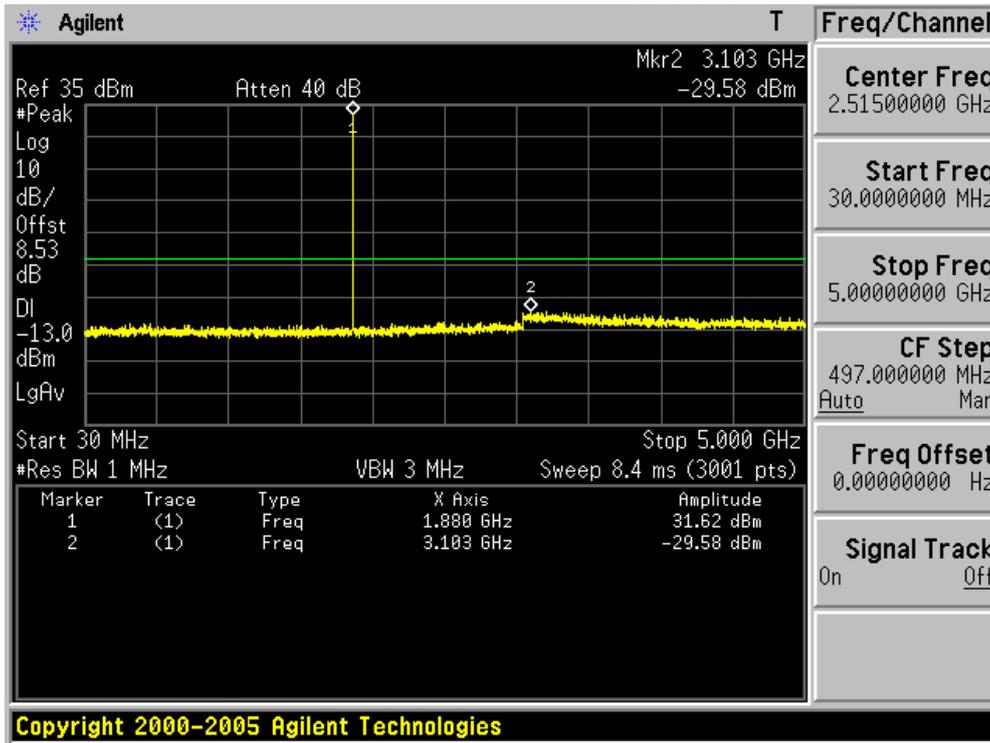
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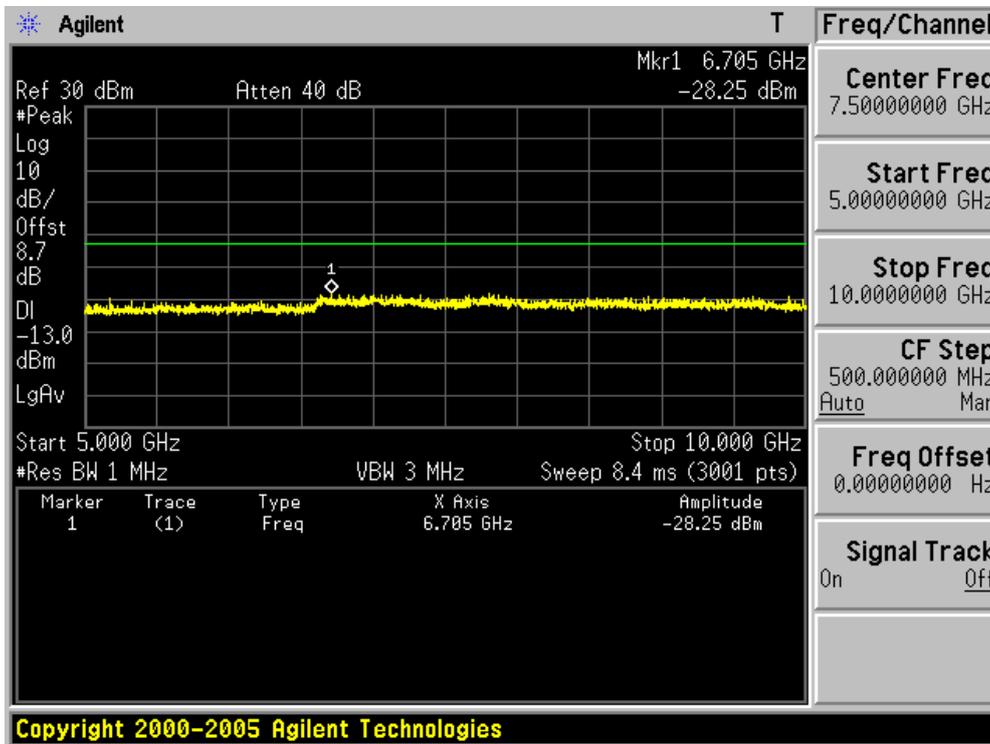
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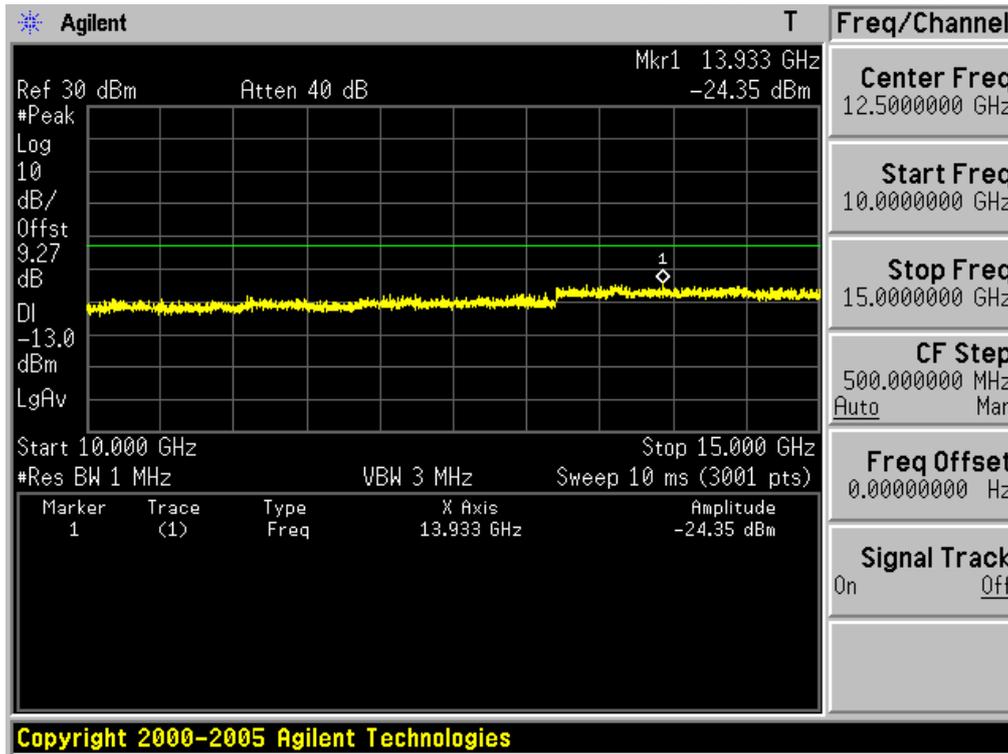
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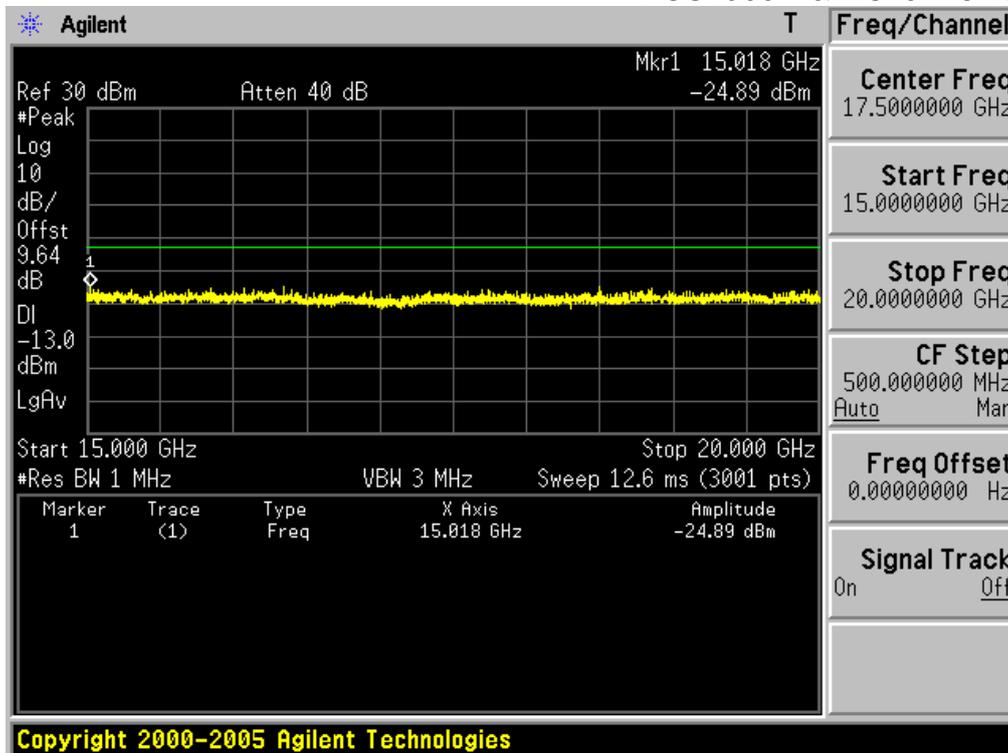
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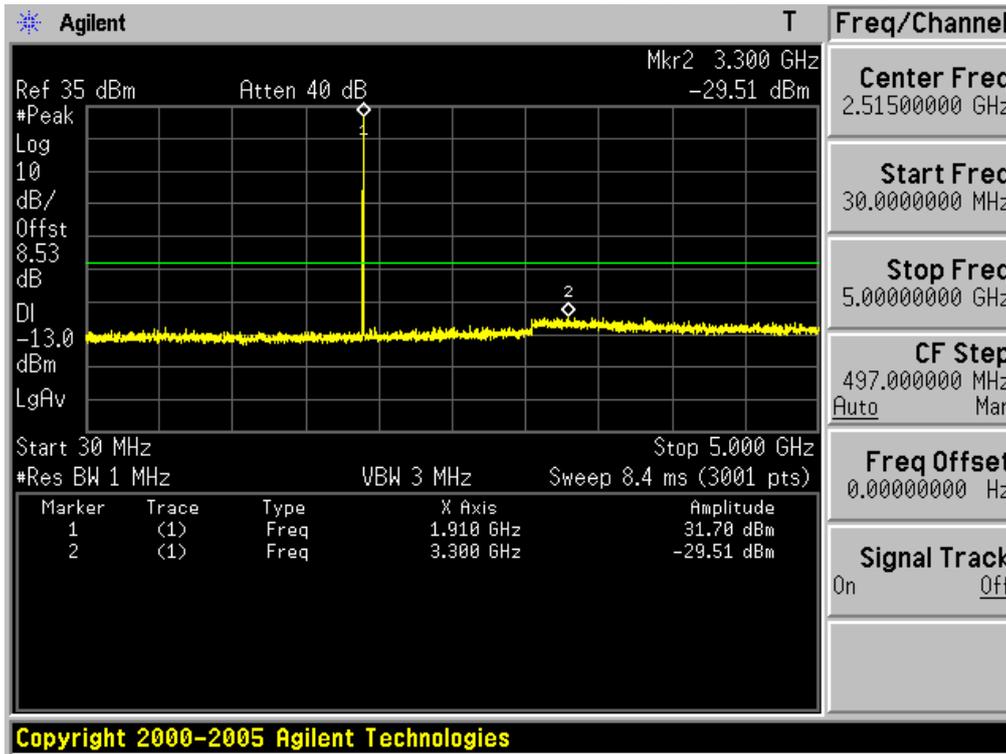
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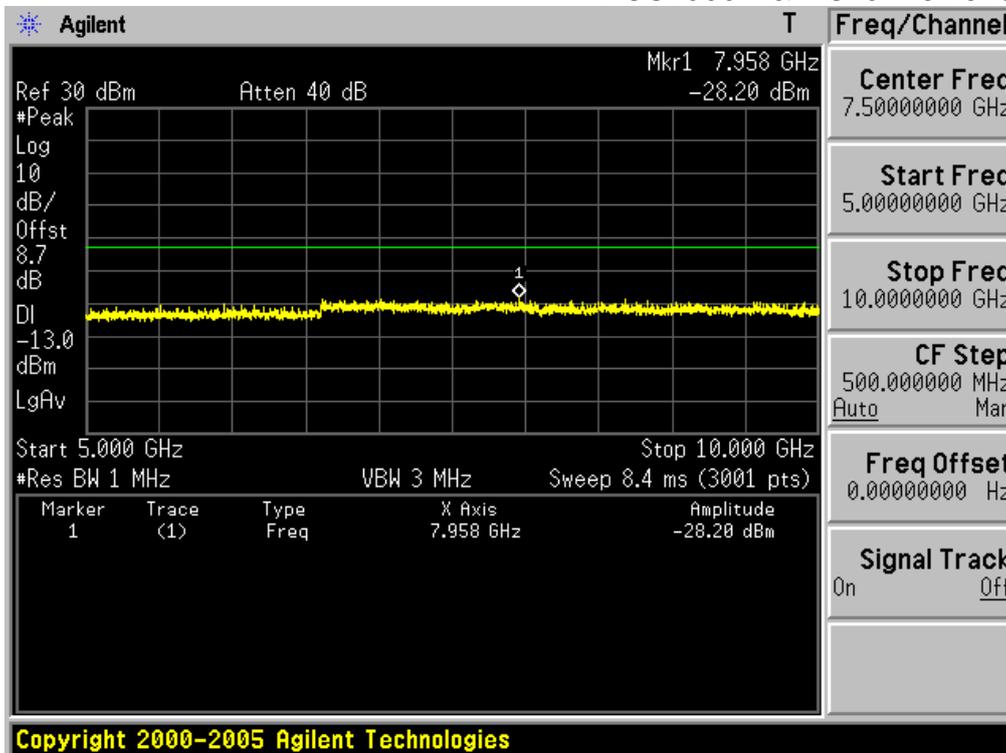
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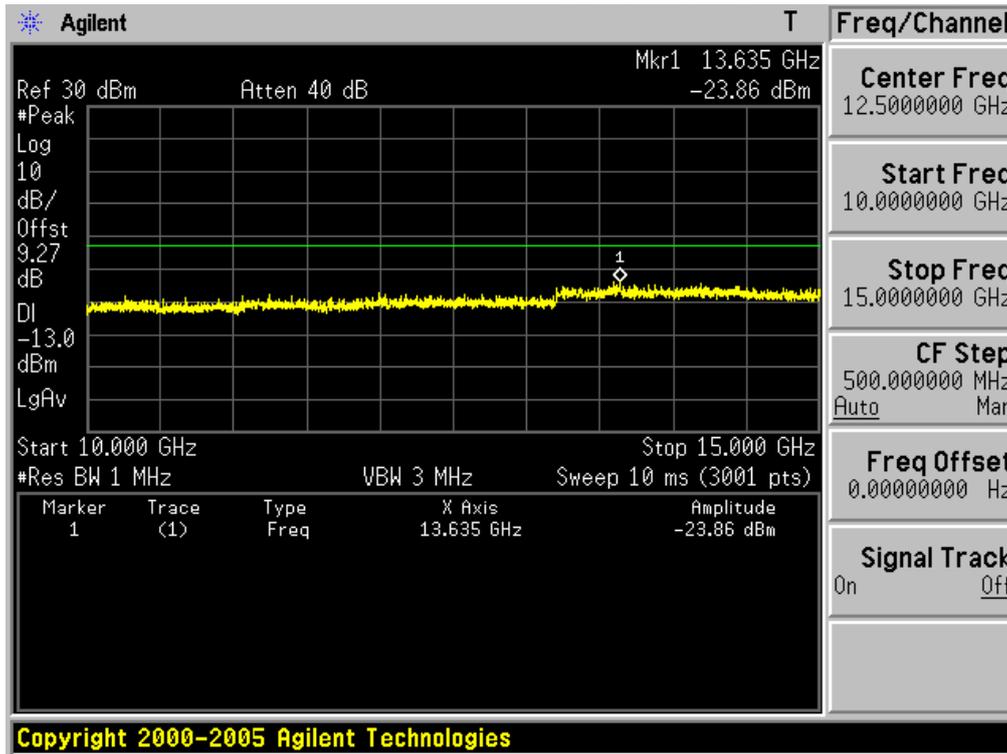
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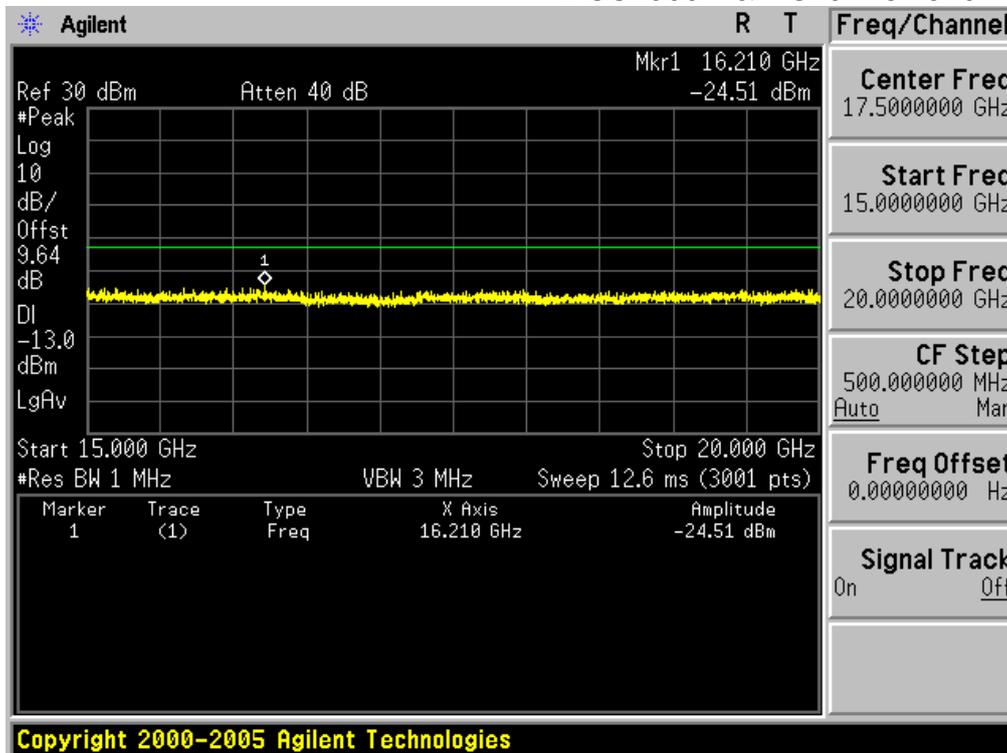
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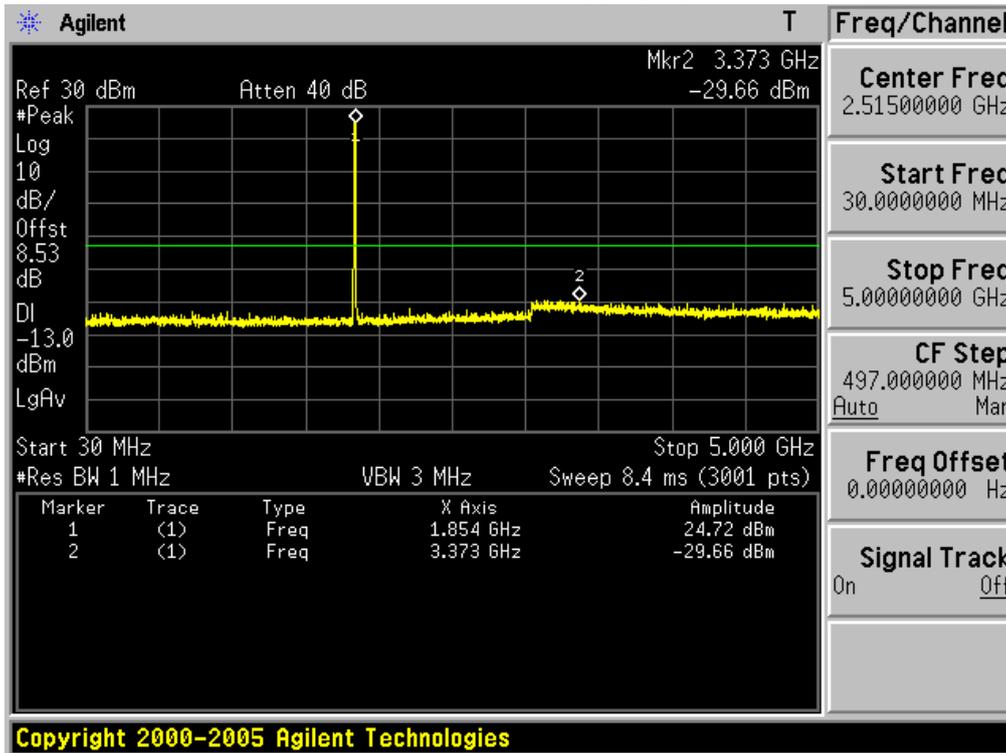
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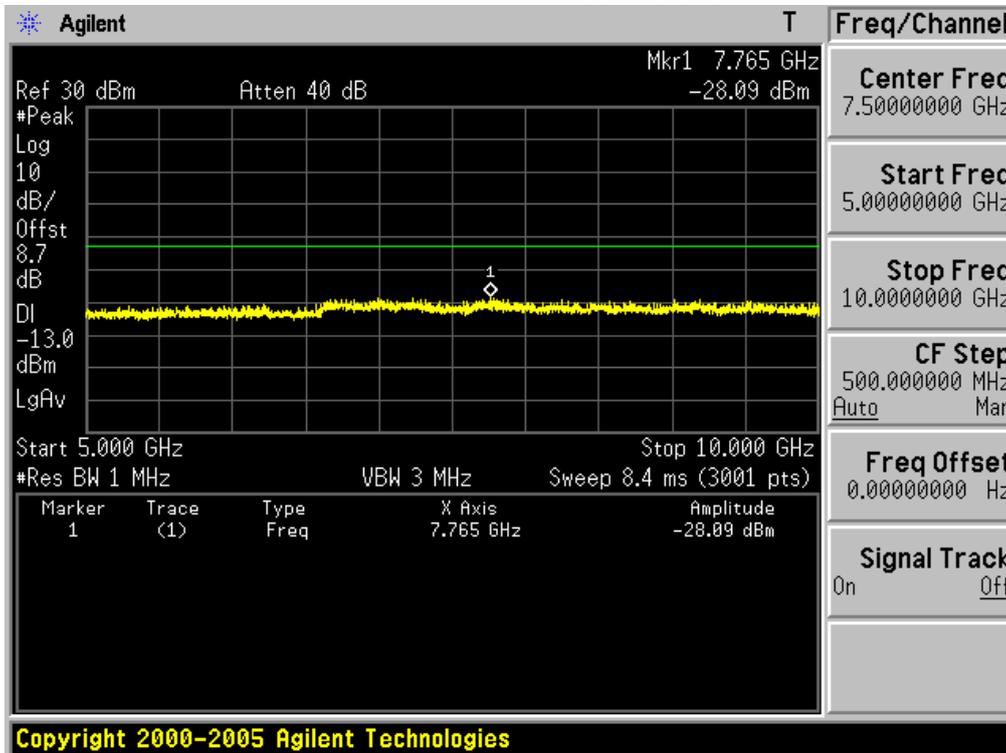
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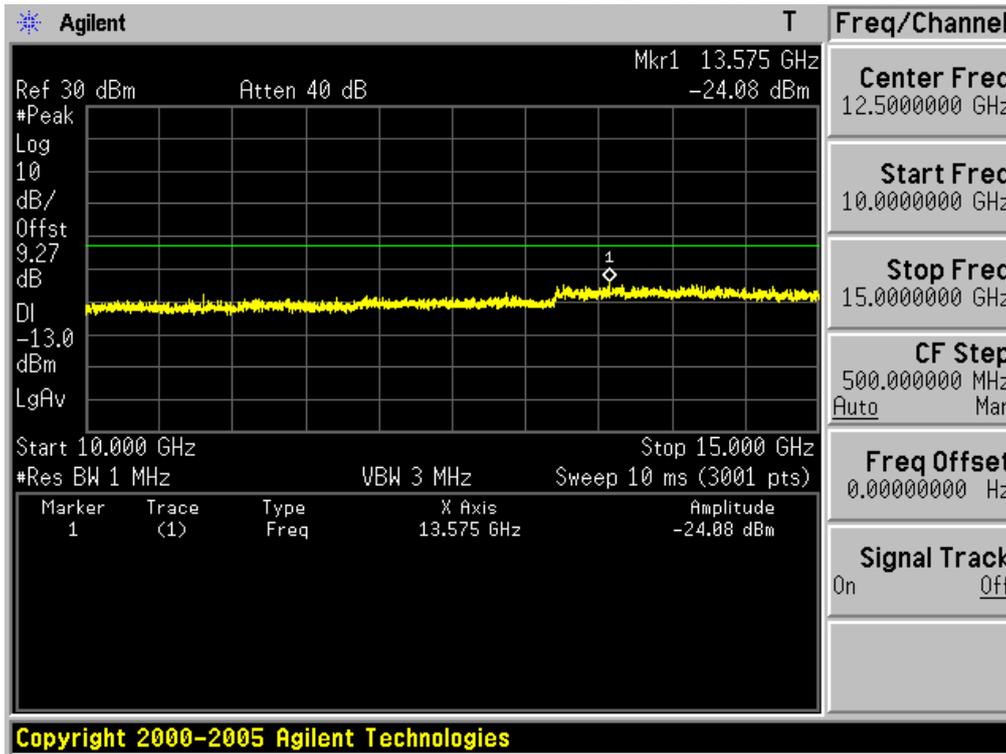
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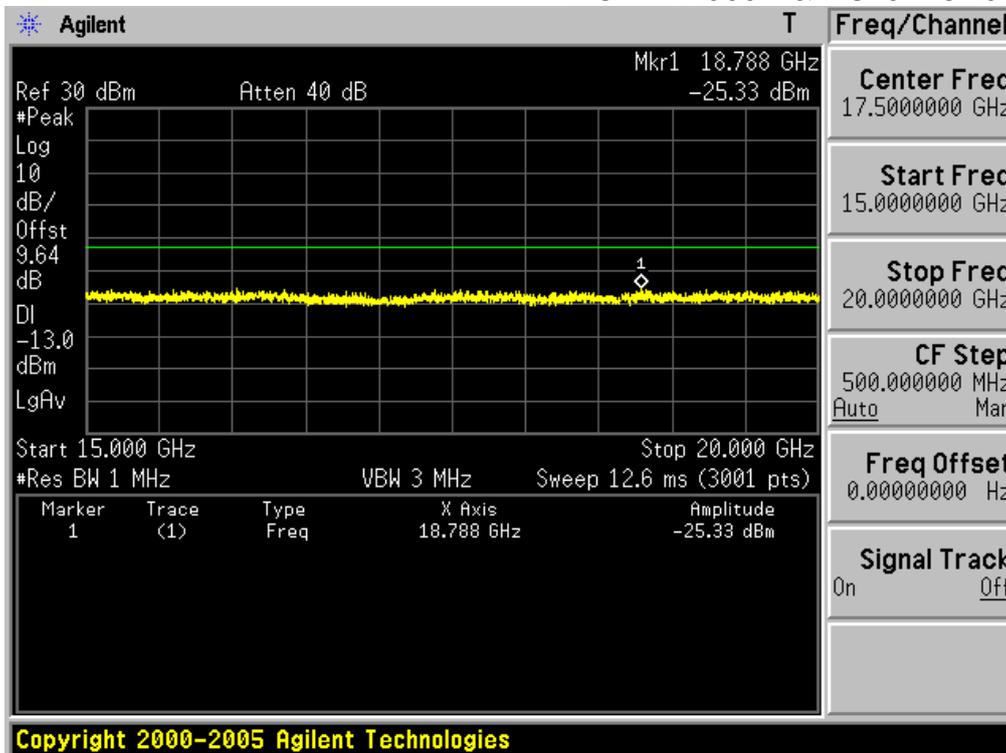
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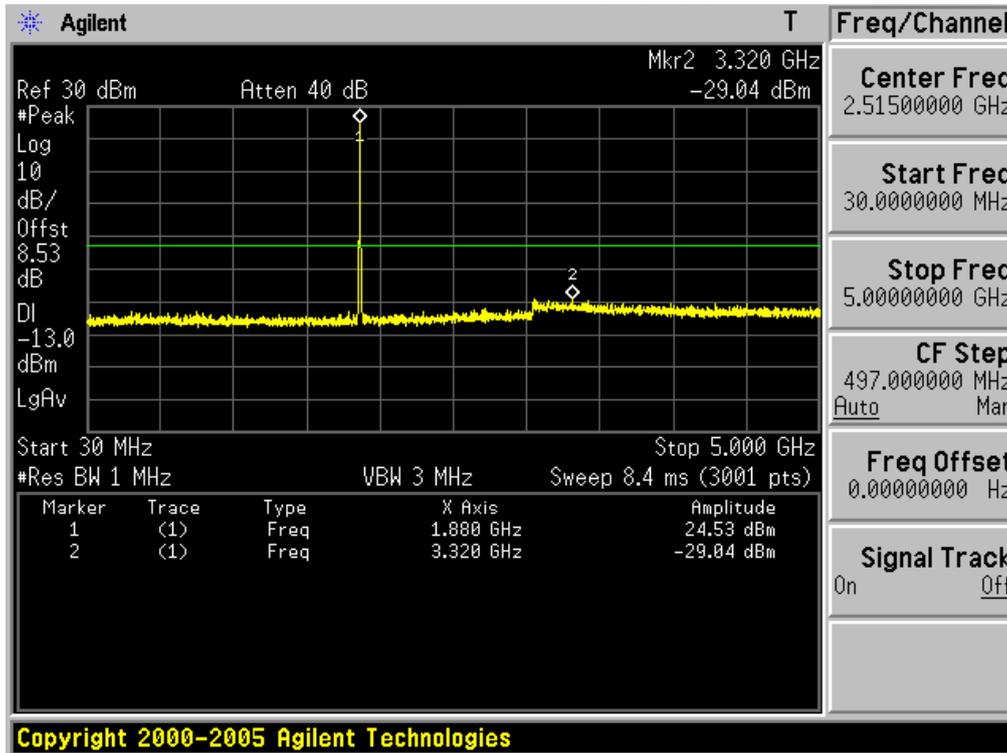
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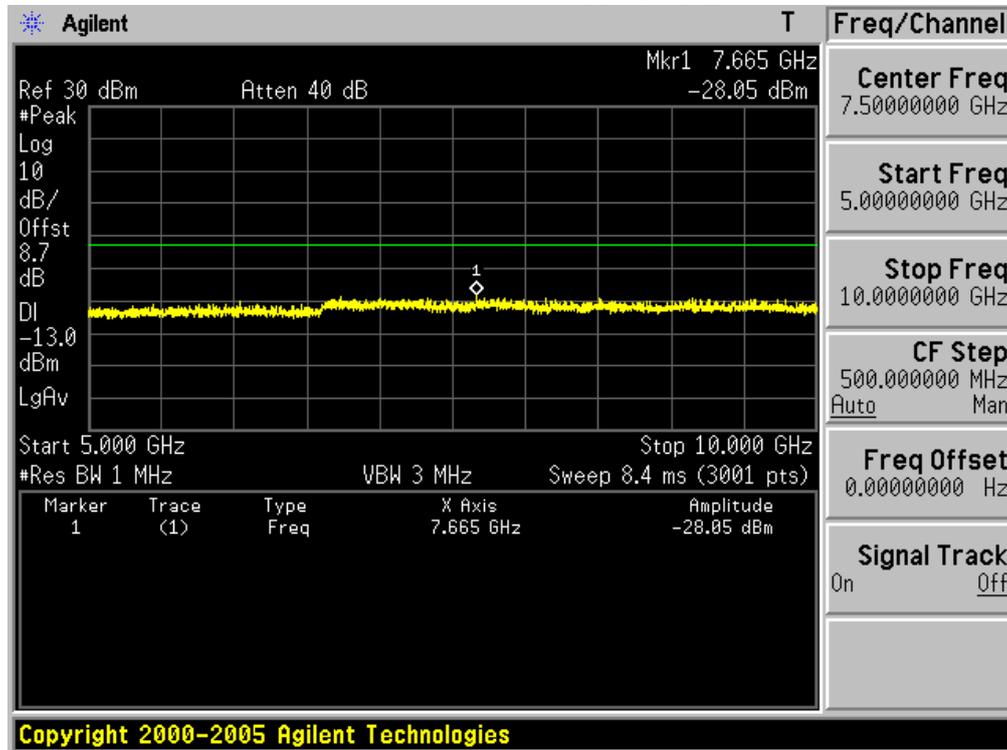
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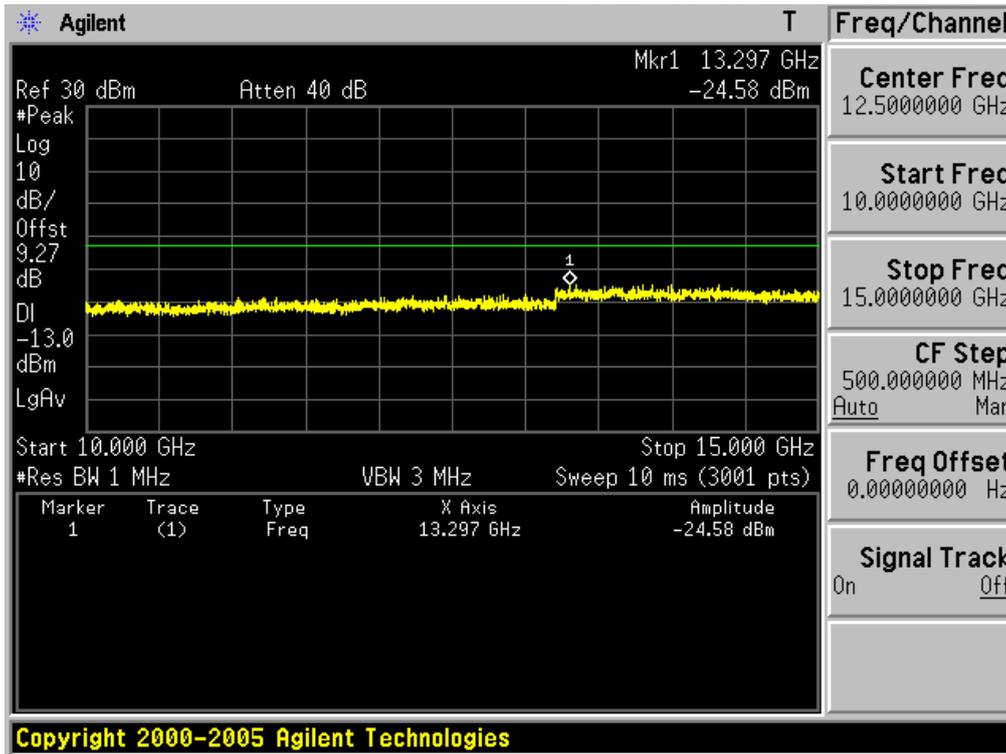
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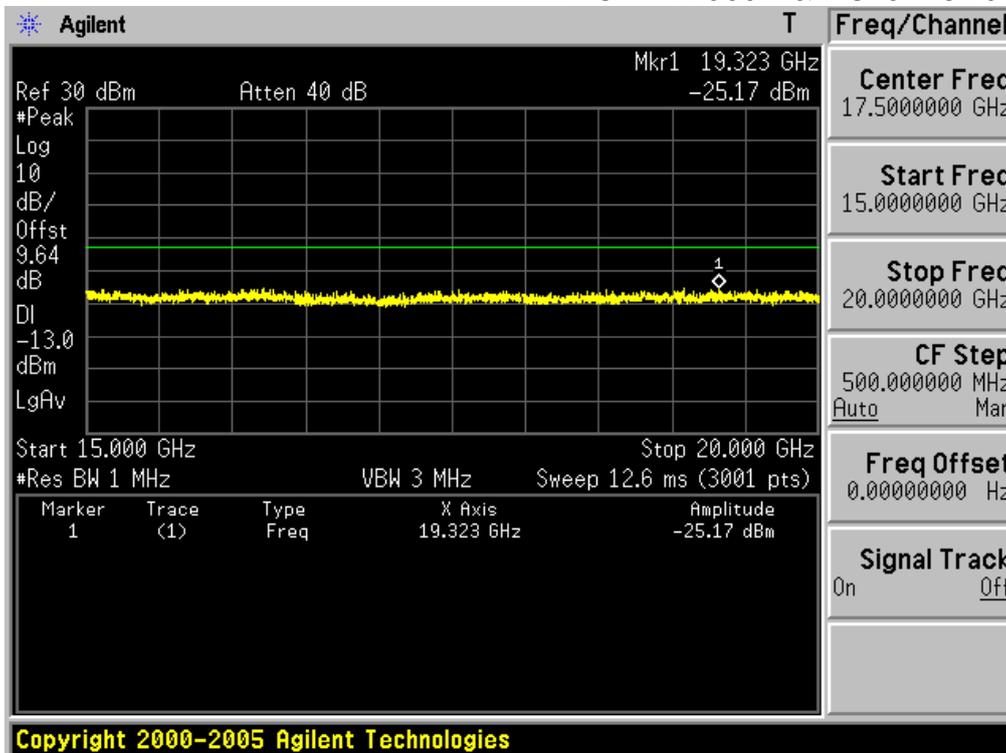
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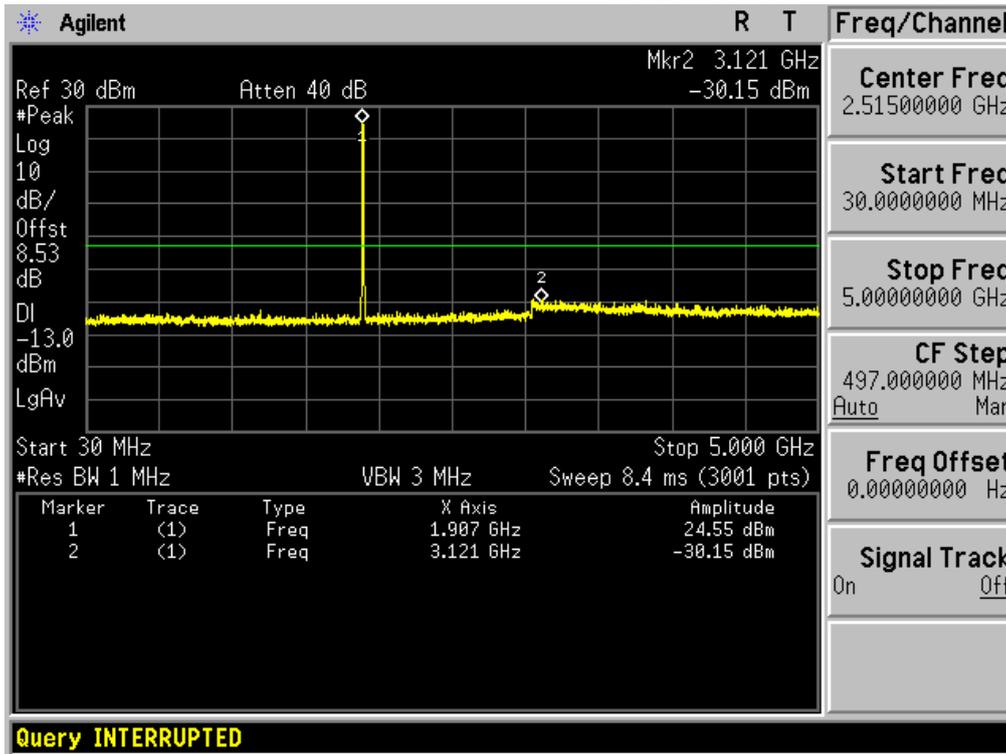
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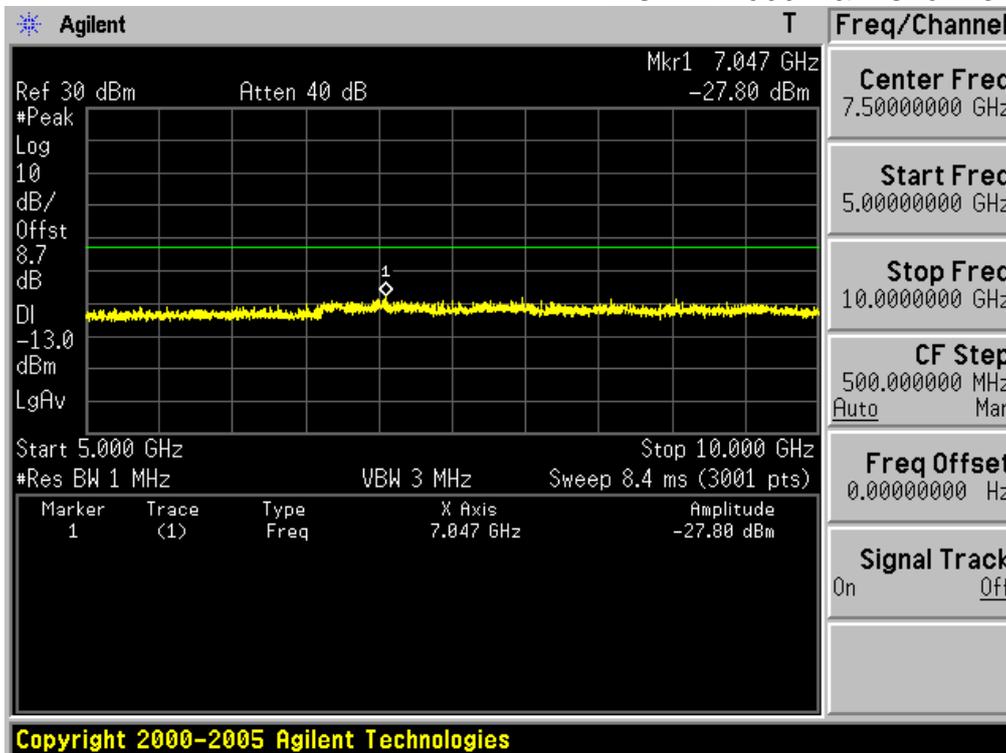
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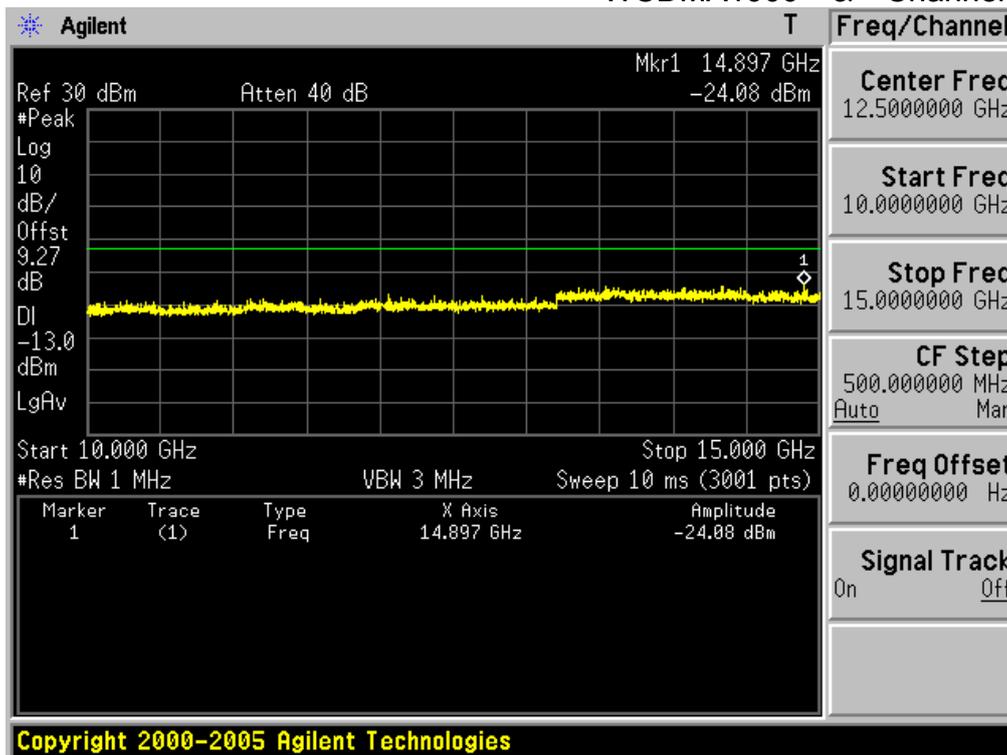
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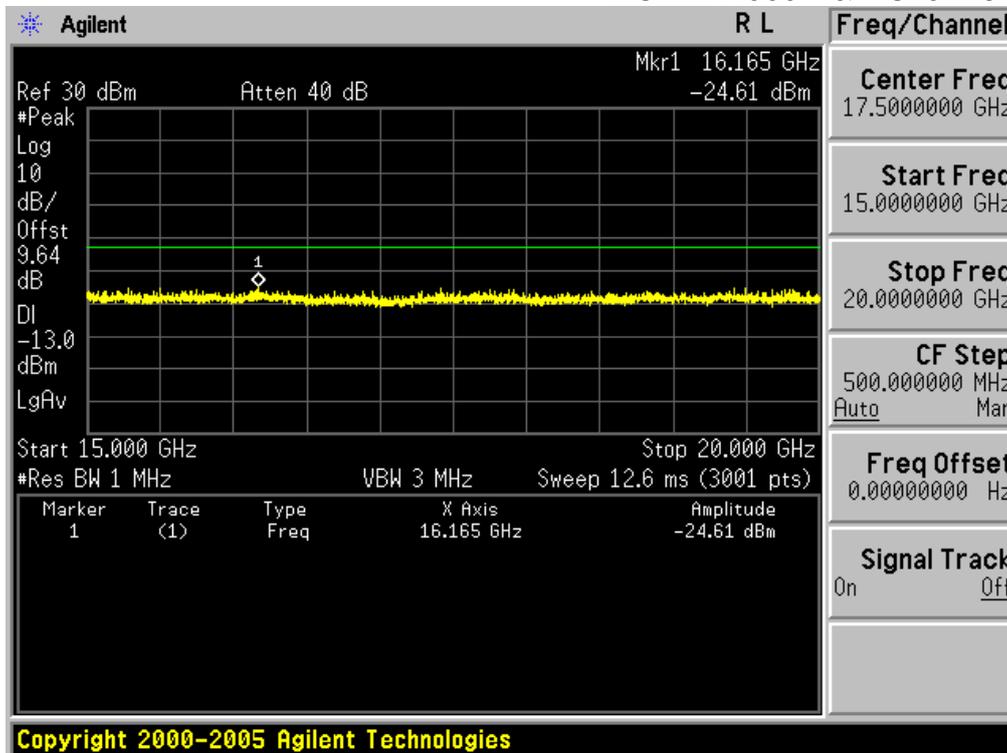
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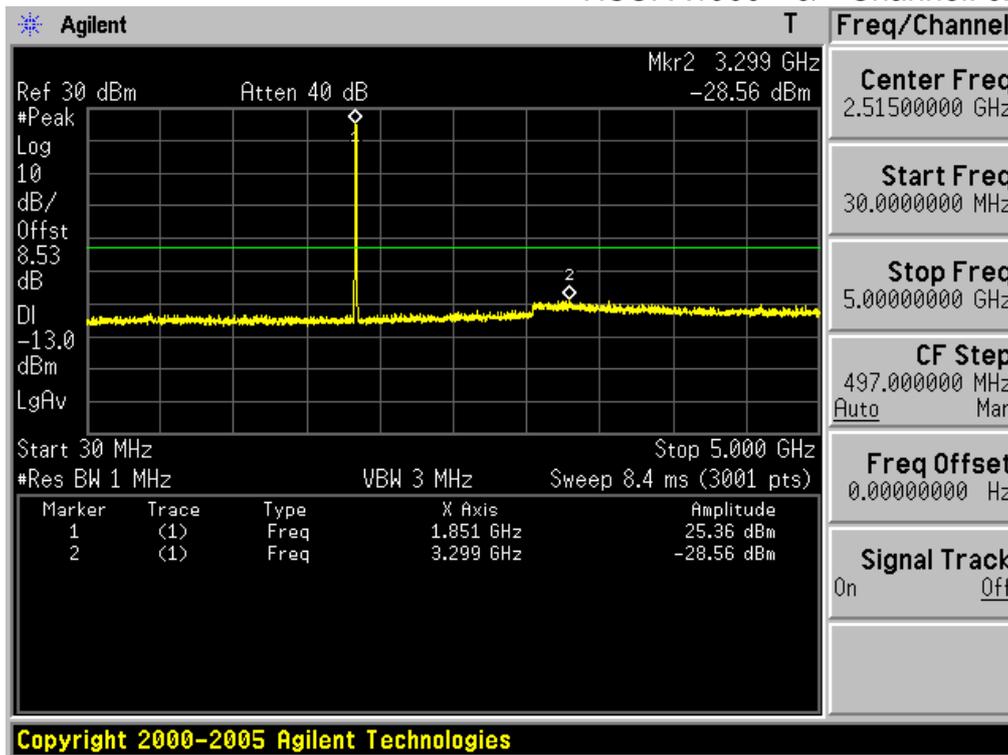
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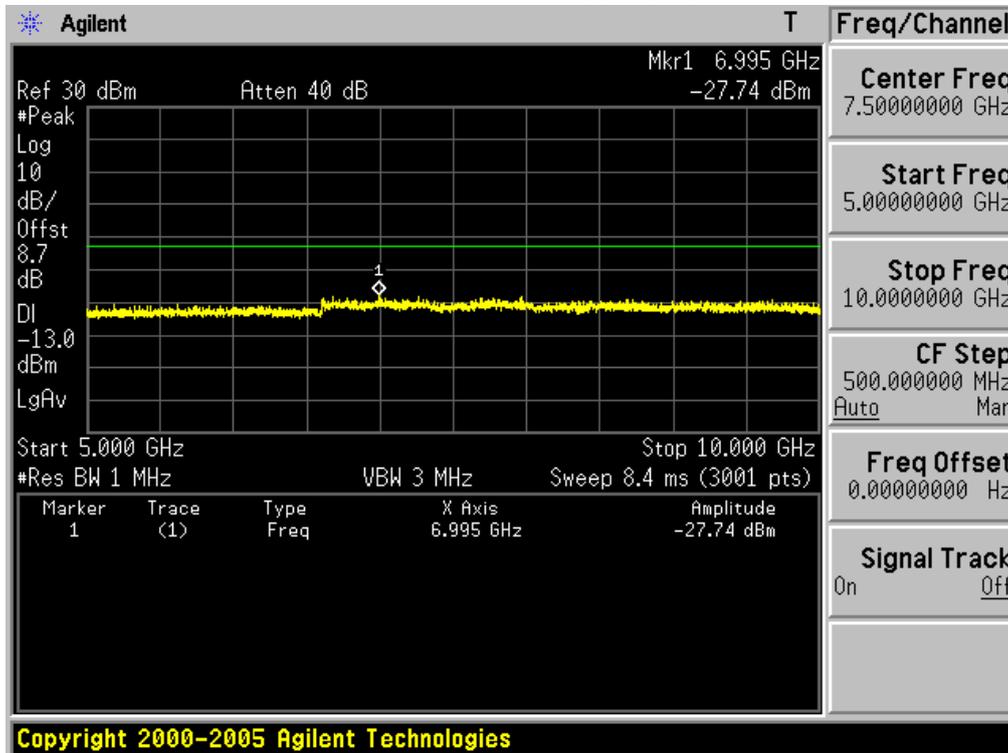
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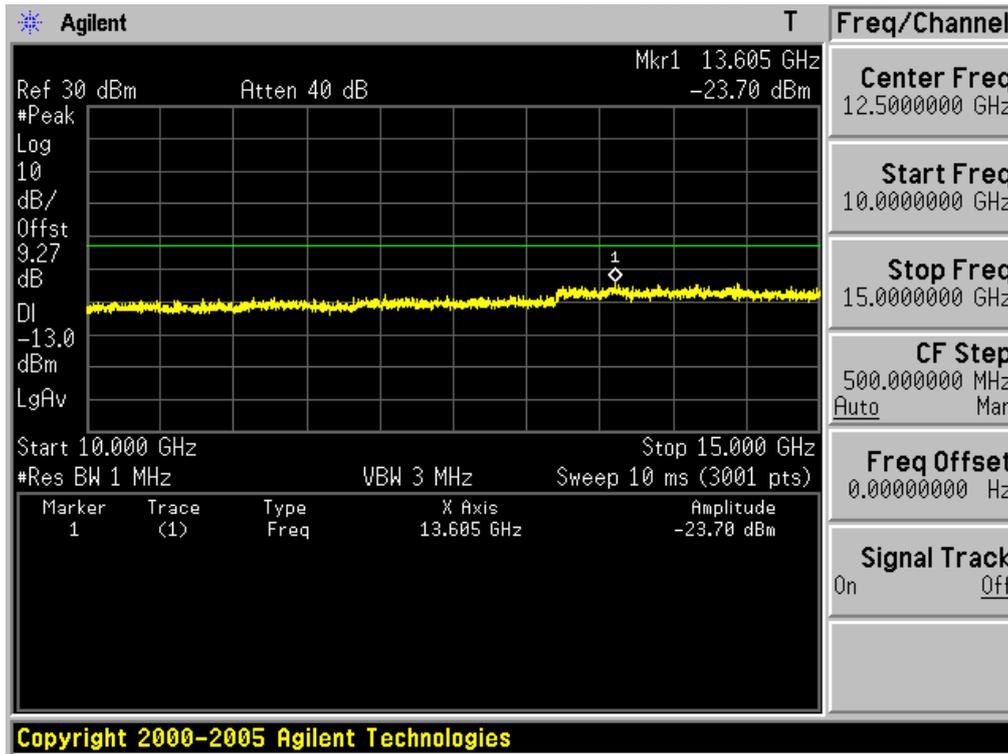
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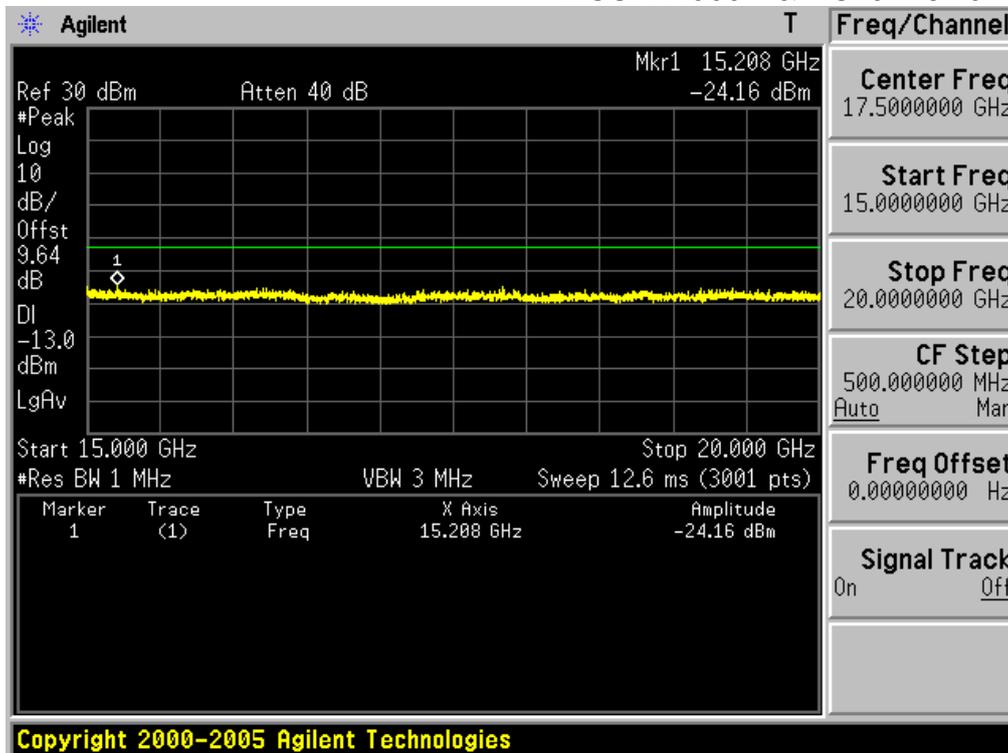
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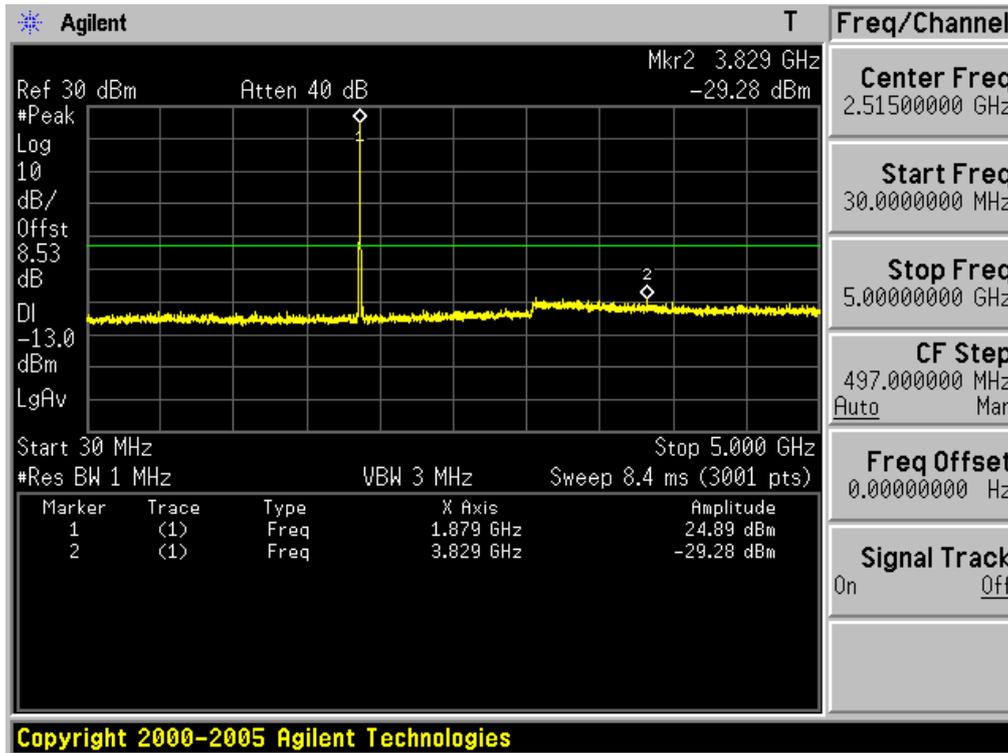
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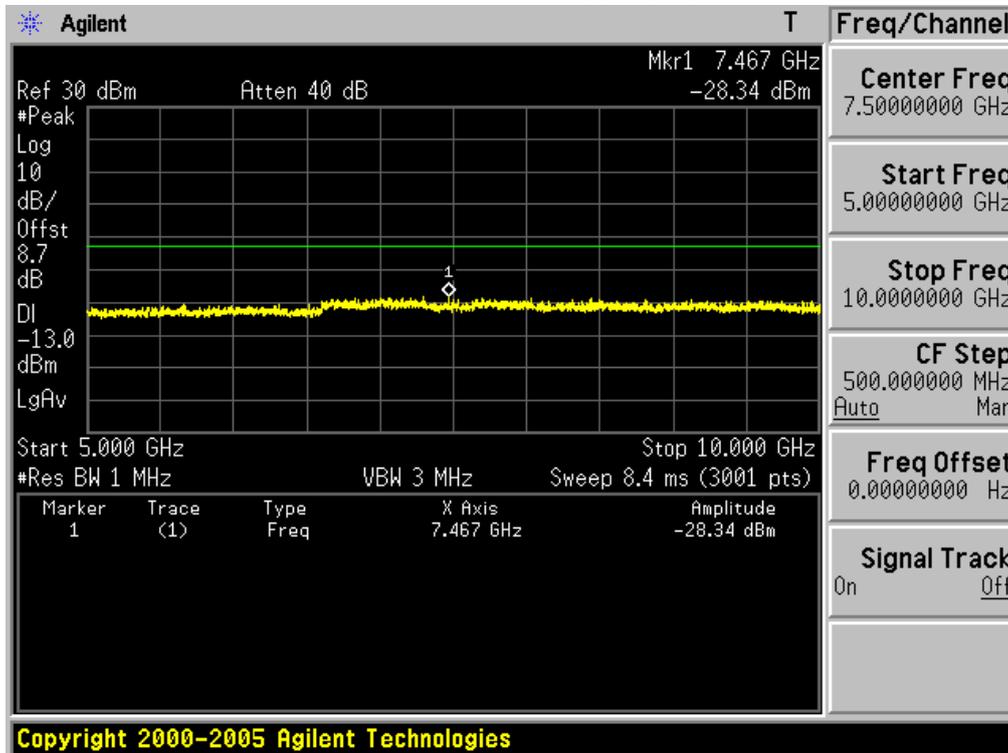
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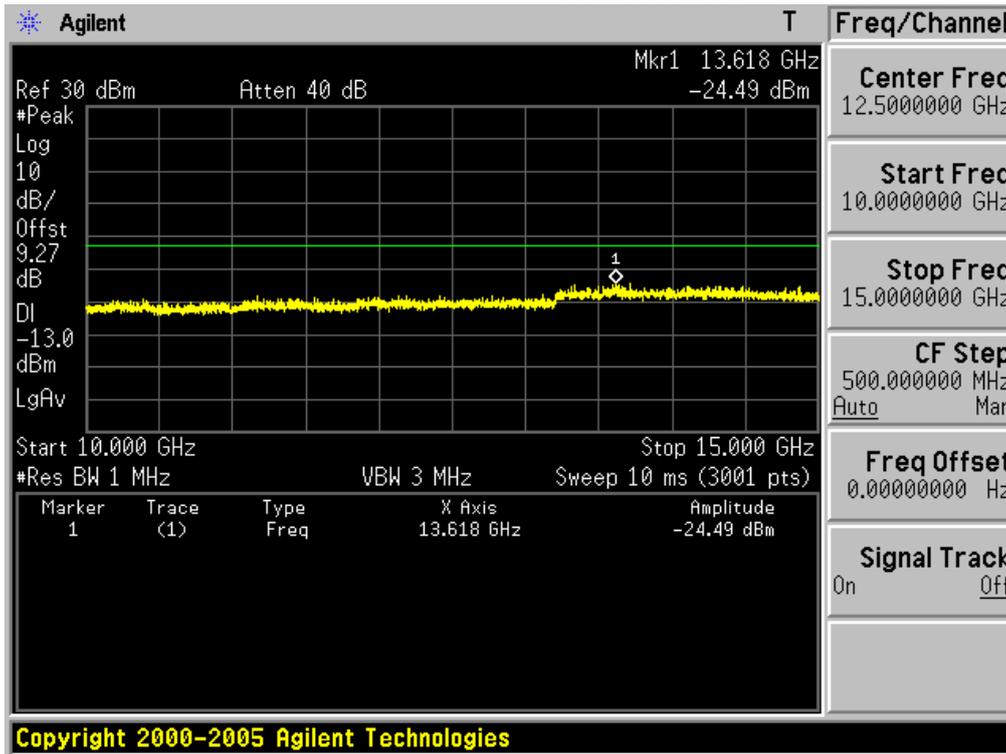
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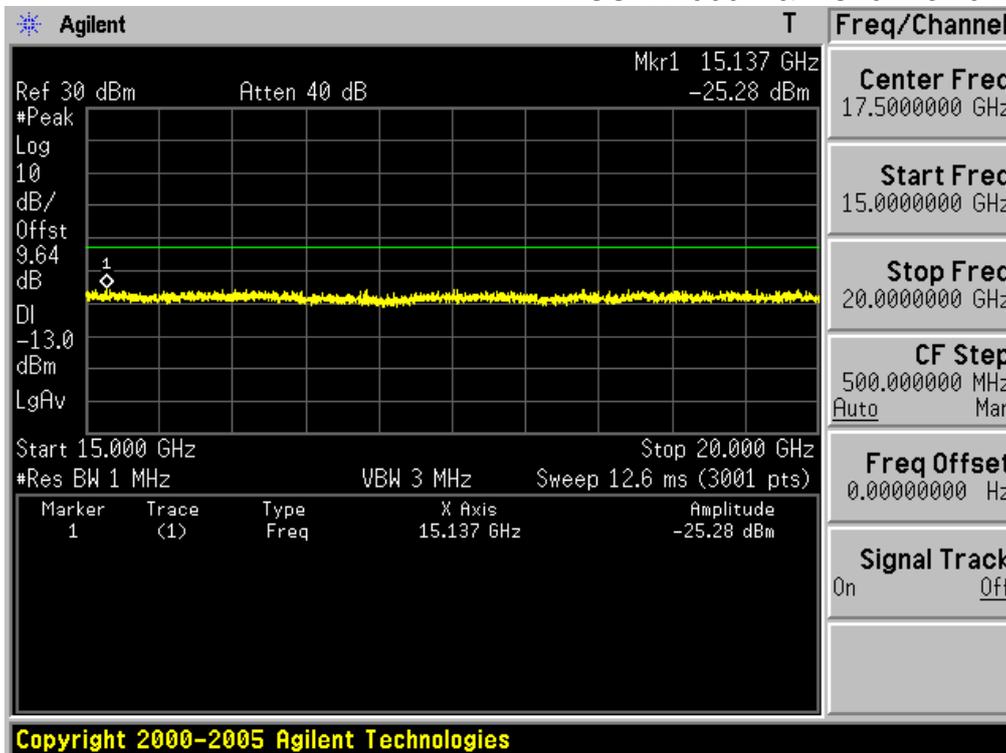
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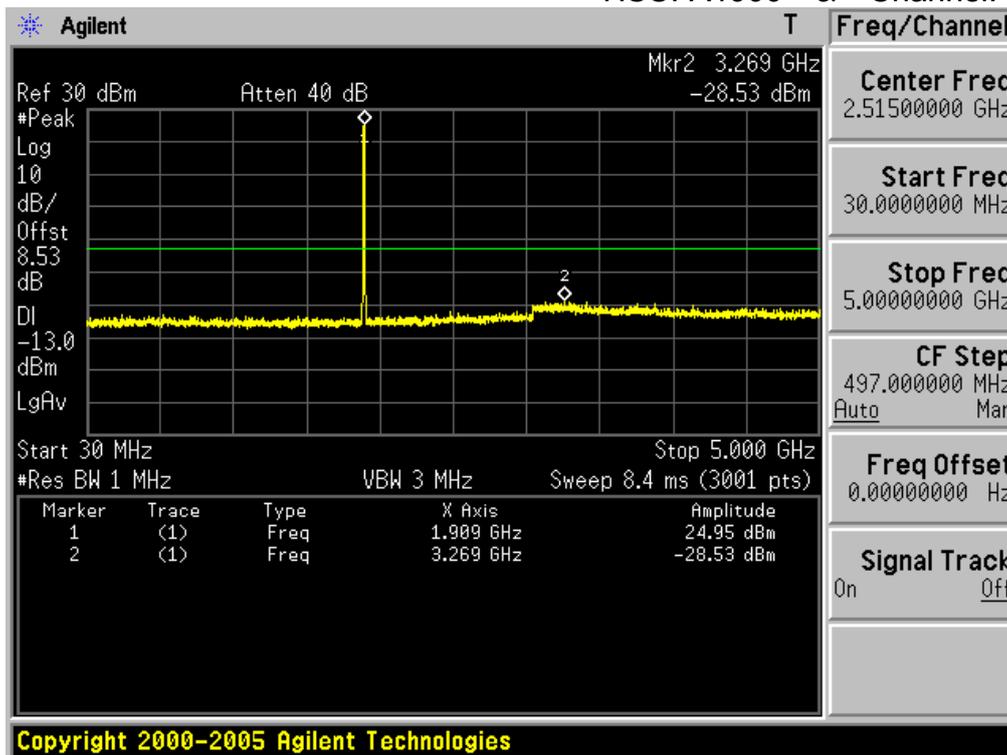
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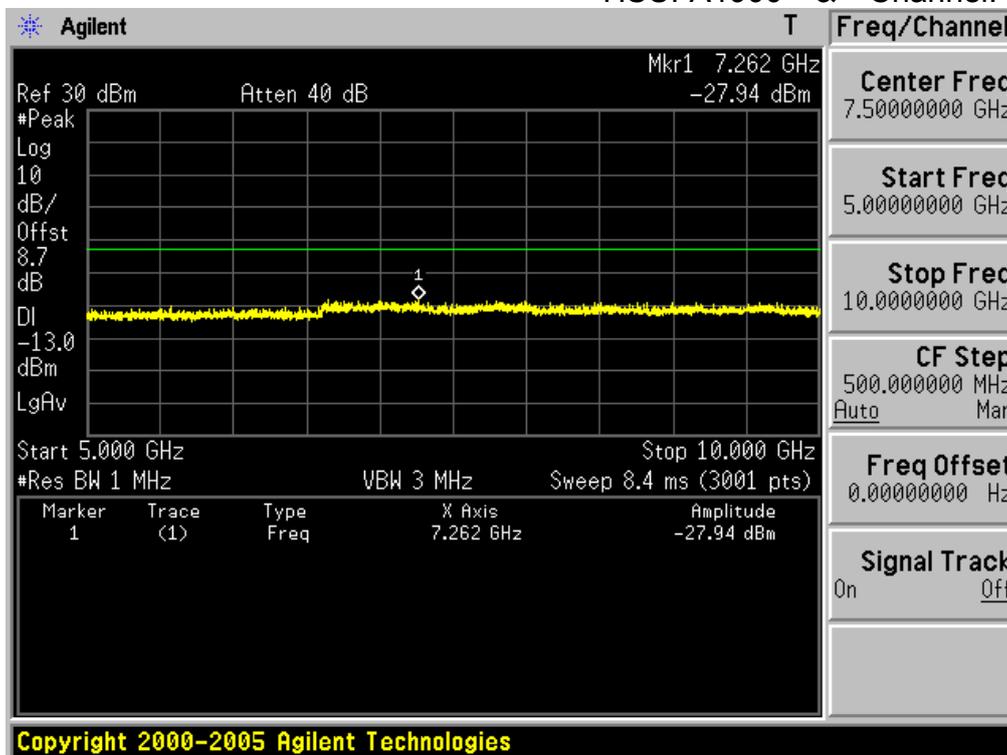
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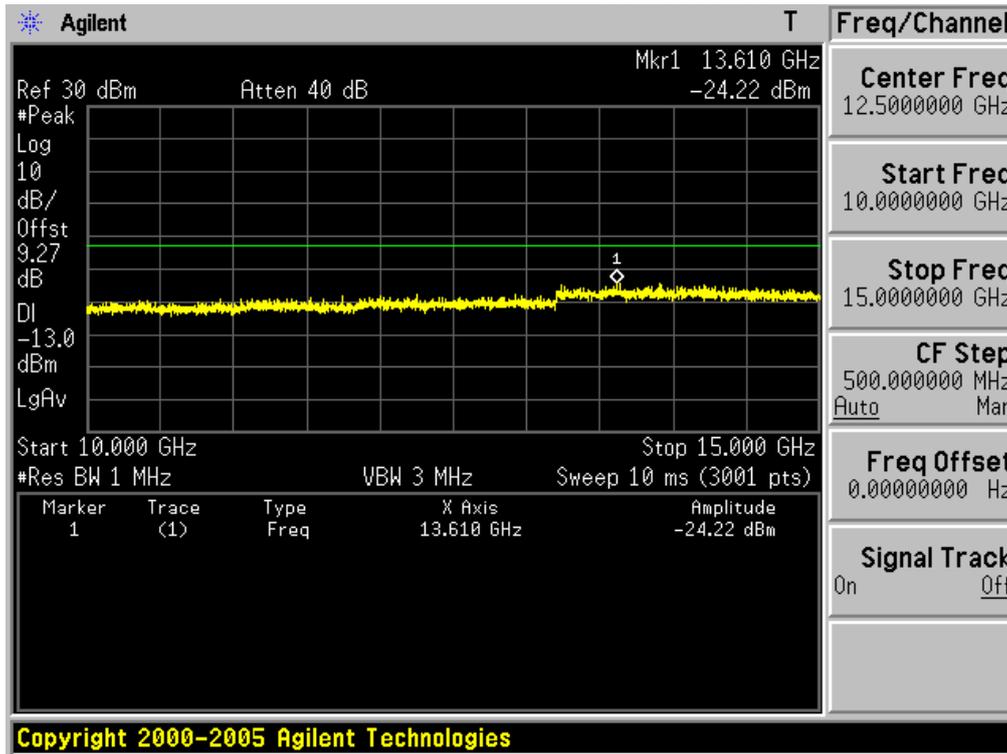
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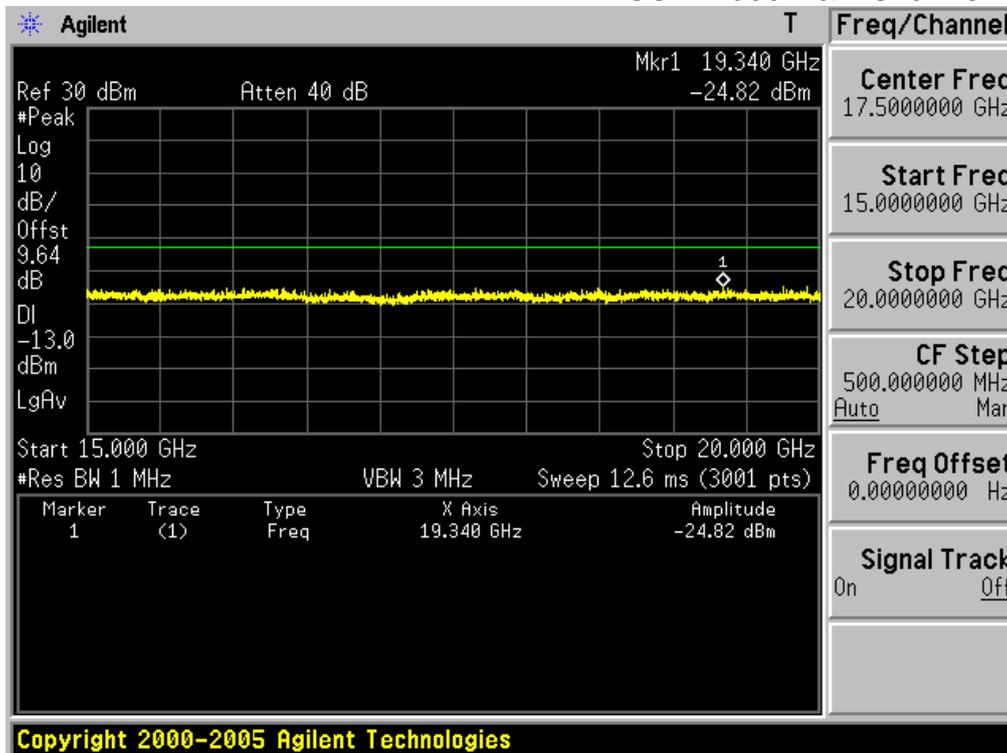
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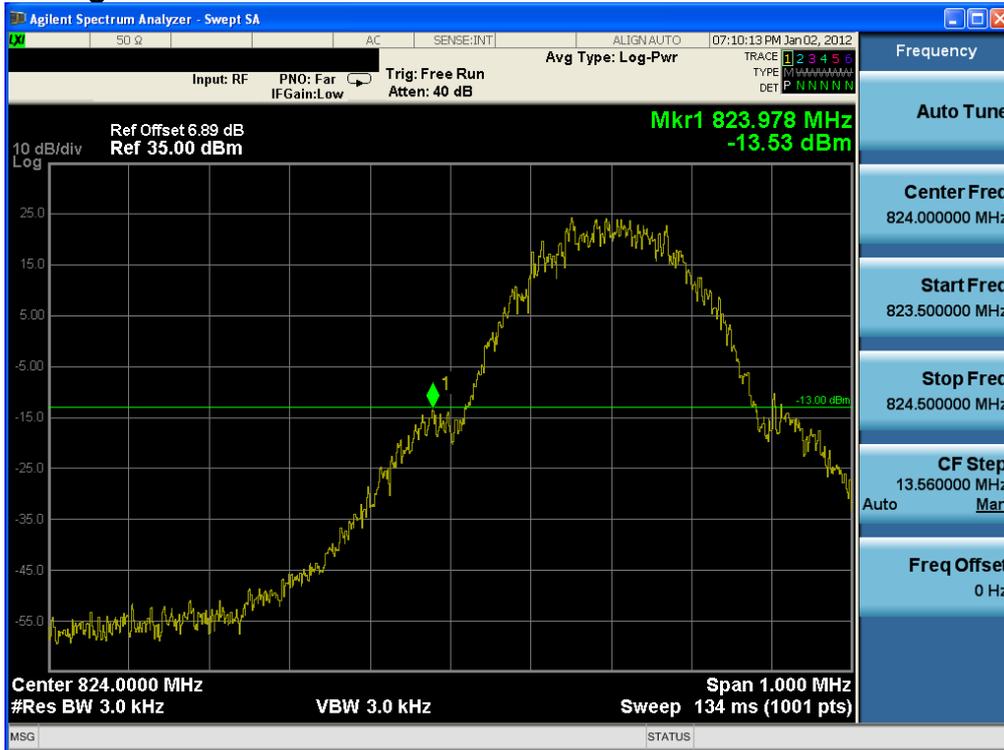


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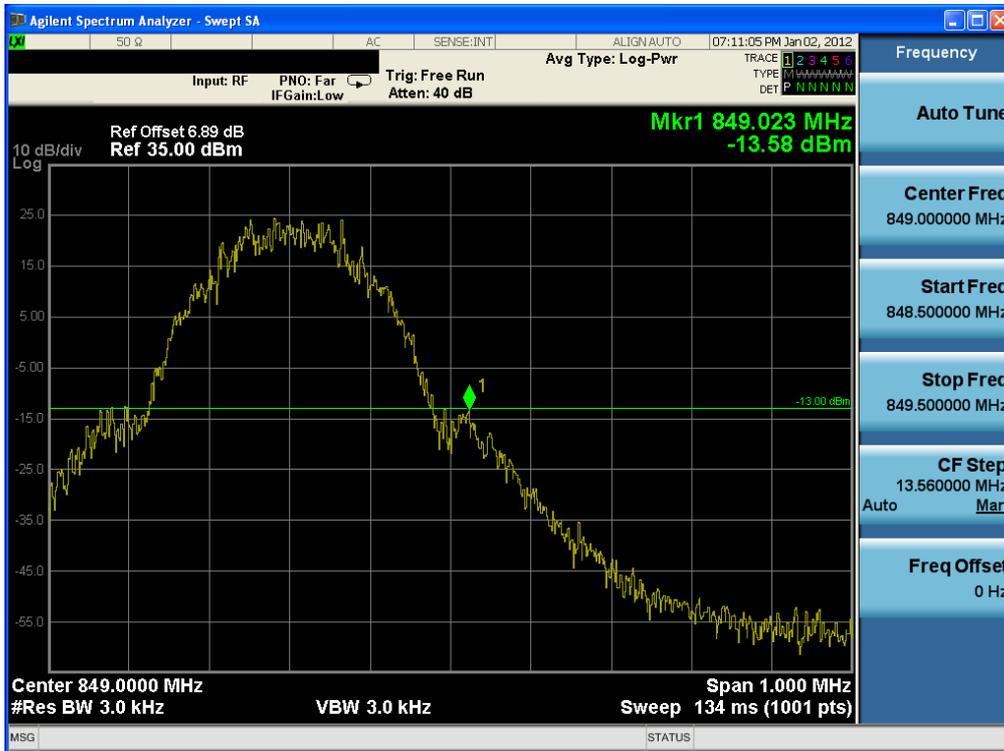


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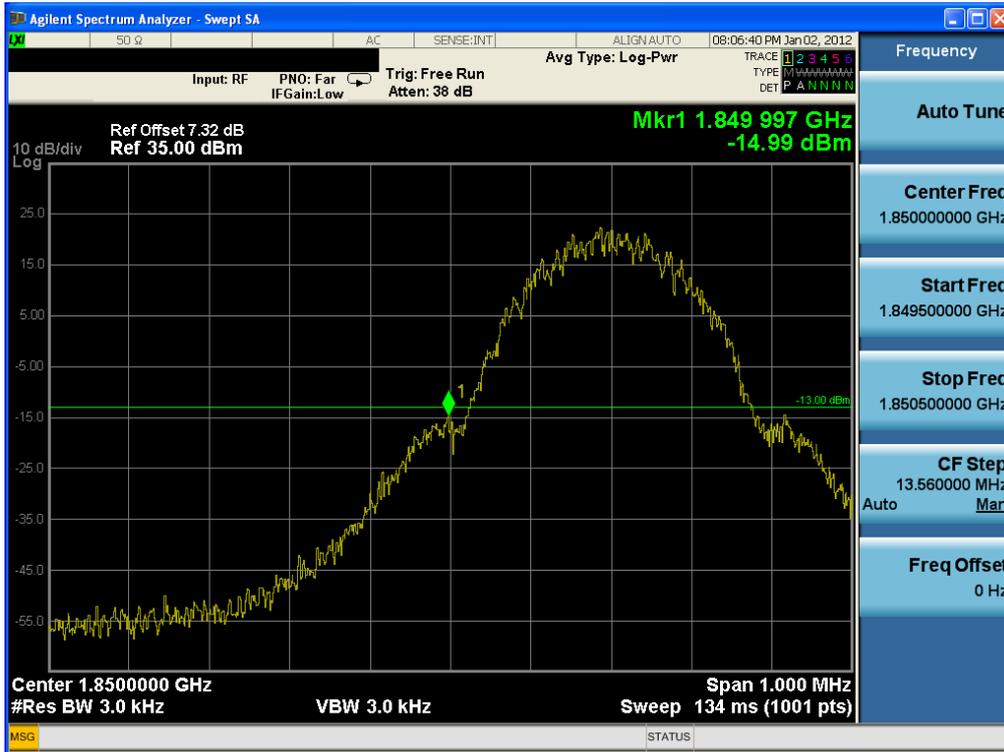
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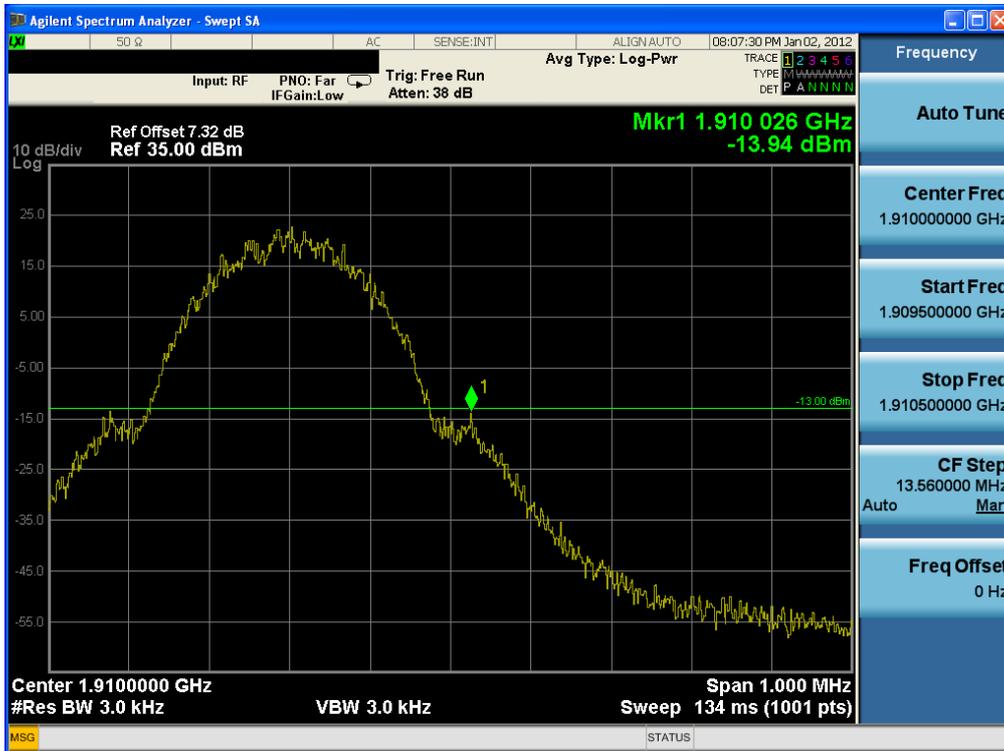
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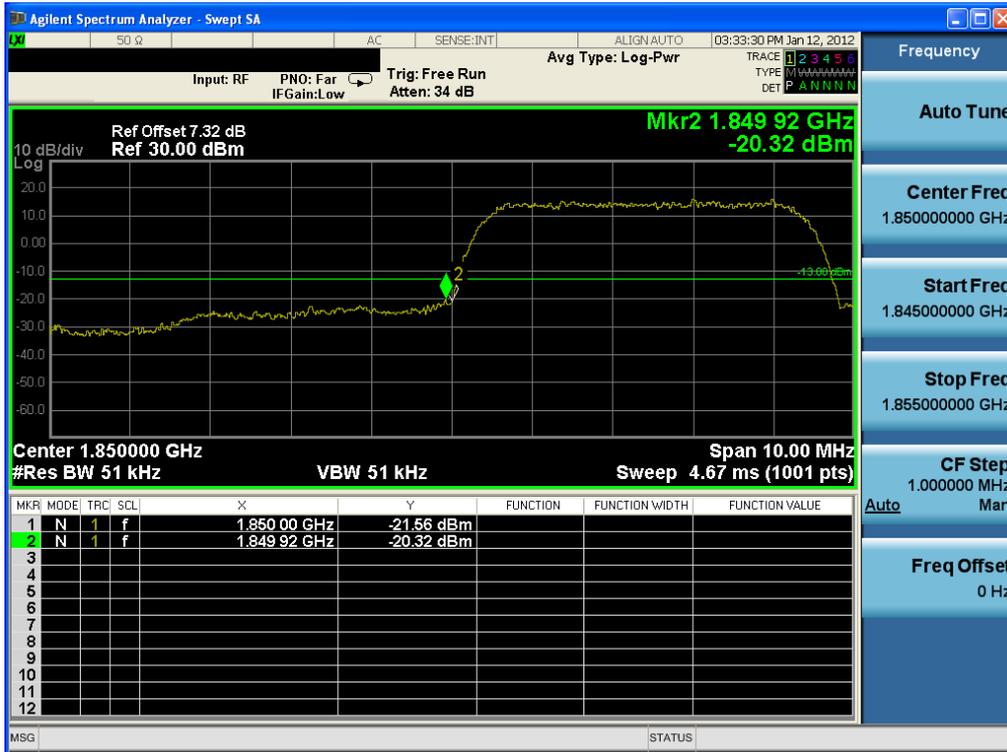
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### PCS1900 & Channel: 810



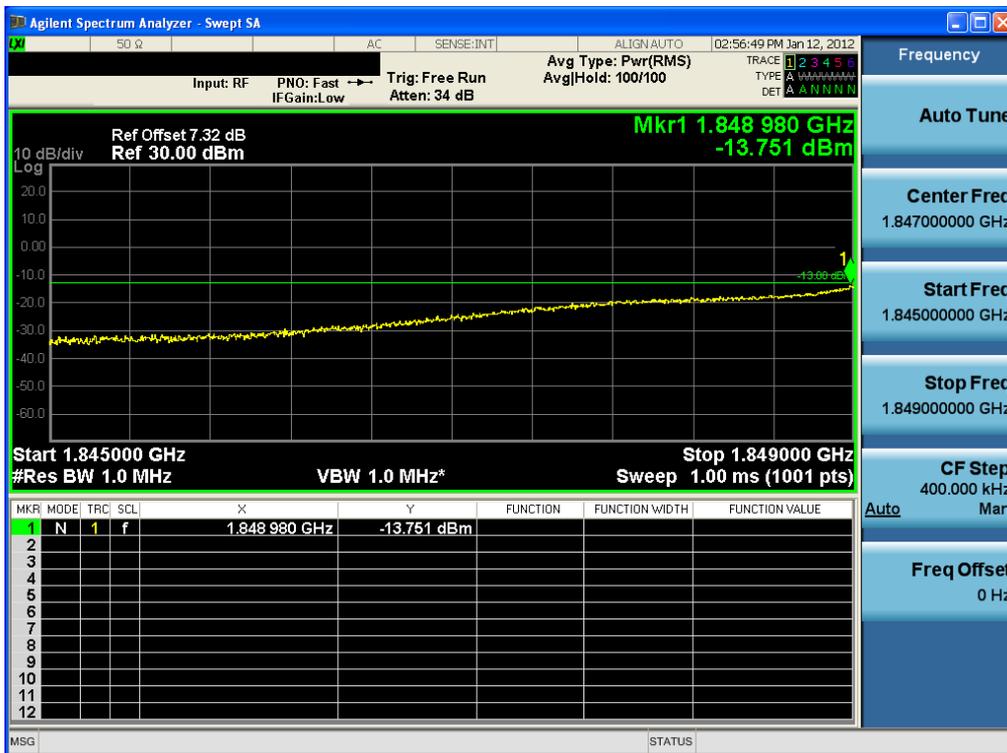
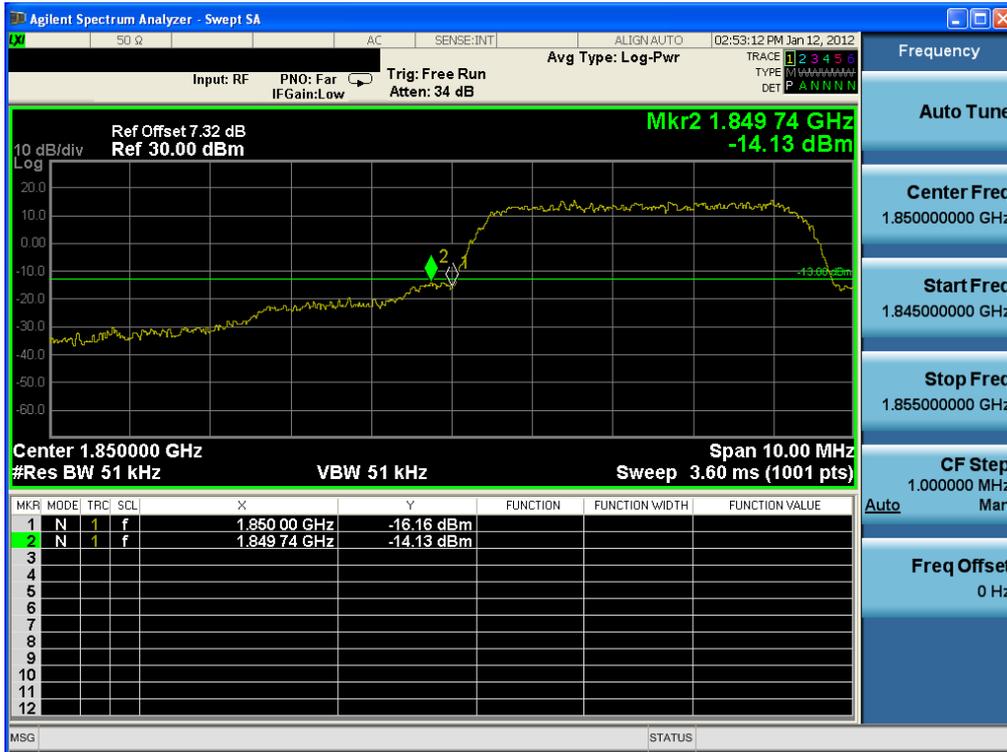
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WCDMA1900 & Channel: 9538



HSUPA1900 & Channel: 9262



HSUPA1900 & Channel: 9538

