

# FCC MEASUREMENT AND TEST REPORT

For

## ZTE Corporation

ZTE Plaza, Hi-tech Park, Nanshan District, Shenzhen,  
Guangdong, China 518057

FCC ID: Q78-RUS82S1900

Nov 14, 2012

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report		<b>Equipment Type:</b> Macro Radio Remote Unit
Test Engineer:	Bloom <i>Bloom</i>	
Report No.:	FCC-2011-090	
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# 1 GENERAL INFORMATION

## Product Description for Equipment Under Test (EUT)

The ZXSDR RSU82 S1900 is a multi-mode remote RF unit that supports 2T4R FDD. It supports GSM, UMTS, and CDMA communications systems and features compact structure, large capacity, and easy installation.

### Technical specification:

Size: 480 mm x 320 mm x 150 mm(H x W x D)

Input voltage: -48Vdc

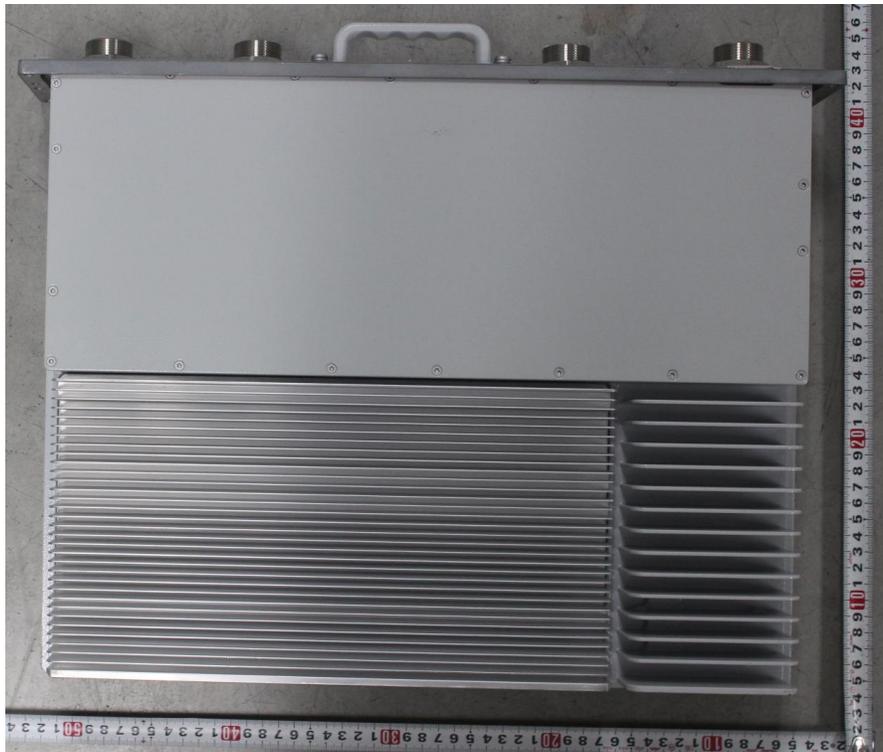
Frequency range: 1930MHz to 1990MHz

Max RF output power: 47.8dBm

Gain of the antenna: 13dBi

Modulation type of emission: the modulation of CDMA is QPSK; UMTS 4 Carriers; GSM 6 TRX; 4 GSM TRX and 1 UMTS carriers or 2 GSM TRX and 2 UMTS carriers

Appearance of EUT:



## Objective

This Type approval report is prepared on behalf of ZTE Corporation in accordance with Part 2:2011,Part 15:2011,Part 24:2011 of the Federal Communication Commissions rules.

## Related Submittal(s)/Grant(s)

No related submittal(s).

## Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2. as well as the following parts:

Part 24 Wireless Communication Services

Applicable Standards: TIA EIA 137-A, TIA EIA 97-D, TIA/EIA 603-C, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

All radiated and conducted measurement was performed at ZTE Corporation Reliability Testing Center. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Test Facility

The Test site used by ZTE Corporation to collect test data is located in the 1/F,B2 Wing, ZTE Plaza, Keji Road South, Shenzhen, Guangdong, 518057, P.R.China, Tel: +86-755-26771609,Fax: +86-755-26770347. Test site at ZTE Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC). ZTE Corporation EMC Lab was certificated by CNAS and the registration number was L0611. The FCC registration number of ZTE corporation EMC lab is 373926. The IC registration number of ZTE corporation EMC lab is 5200A. The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 0009043175. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## 2 SYSTEM TEST CONFIGURATION

### Description of Test Configuration

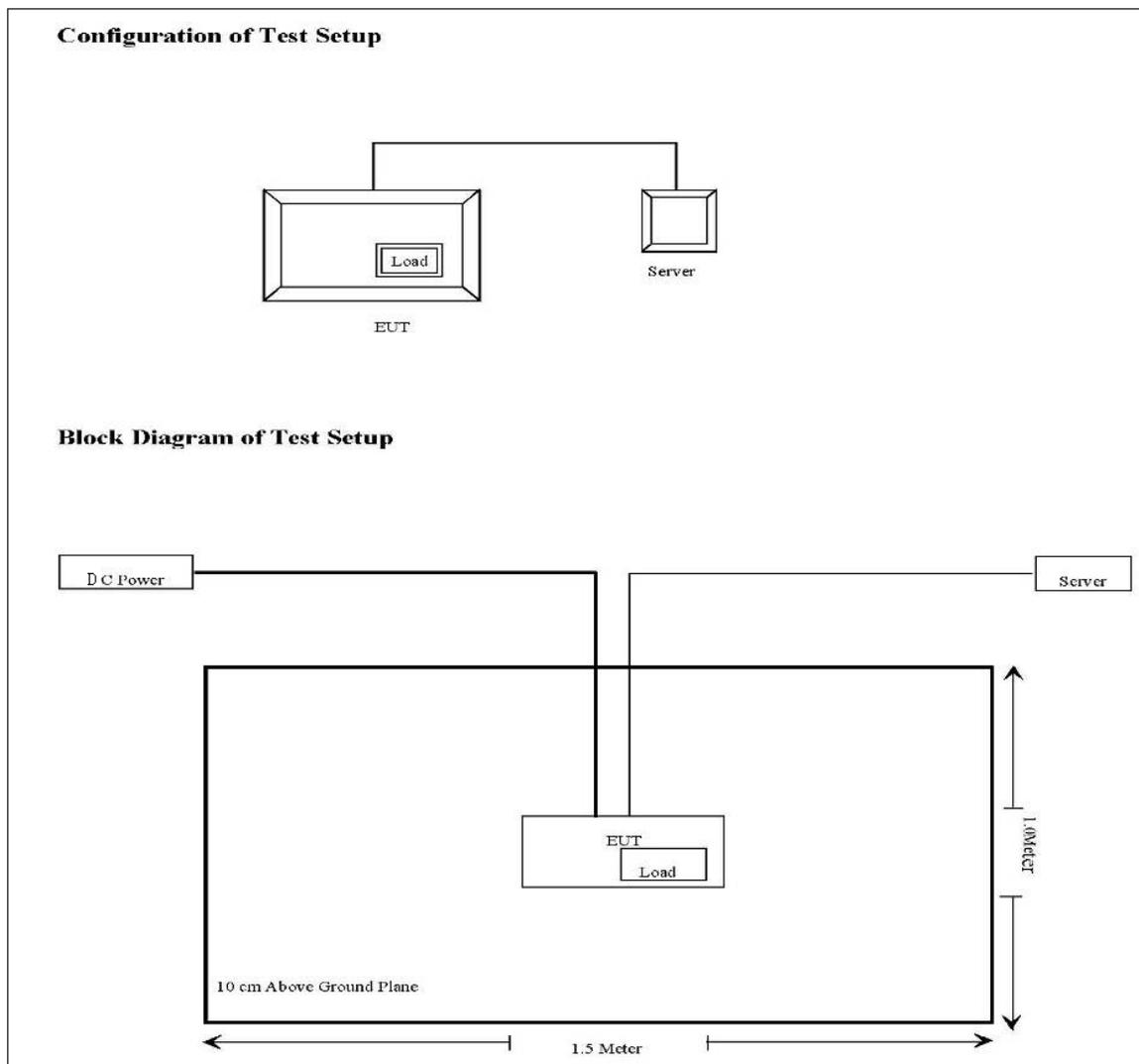
#### Justification

The EUT was configured for testing according to TIA/EIA-603C.

The final qualification test was performed with EUT operating at normal mode.

#### Equipment Modifications

ZTE Corporation has not done any modification on the EUT.



### 3 CDMA OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1046 §24.232	Transmitter output Power	Compliant
§2.1091 §1.1037	RF Exposure	Compliant
§2.1047	Modulation Characteristic	Compliant
§2.1053	Spurious Radiated Emissions	Compliant
§2.1051, §24.238	Spurious Emissions AT Antenna Terminals	Compliant
§2.1049 §24.229 §24.238	Occupied Bandwidth	Compliant
§2.1051, §24.238	Band Edge	Compliant
§ 2.1055 § 24.235	Frequency stability	Compliant

# 3.1 TRANSMITTER OUTPUT POWER

## Applicable Standard: FCC §2.1046 §24.232

According to FCC §2.1046 & 24.232, the EIRP (equivalent isotropically radiated power) must not exceed 1640 Watts.

According to RSS-133, SRSP 510 5.1.1 the EIRP (equivalent isotropically radiated power) must not exceed 3280Watts/MHz for base station transmitters operating in the band of 1930 MHz to 1995MHz with the antenna height above average terrain up to 300 meters. If used in urban area, the limit should be 1640Watts/MHz.

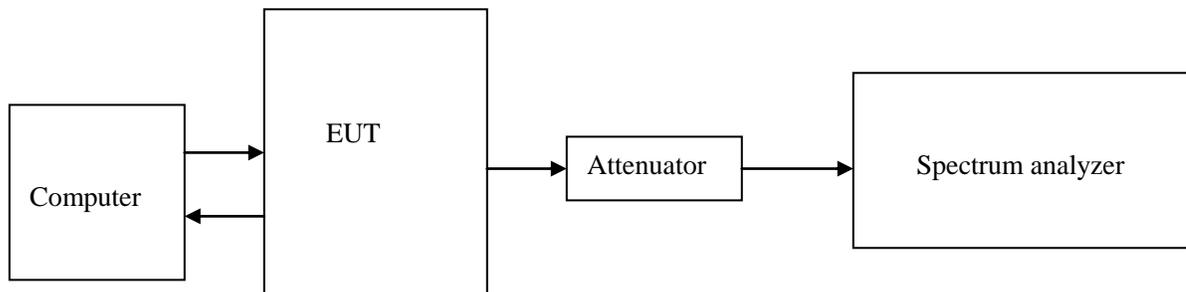
Note:  $EIRP = \text{Max output Power} + \text{Antenna gain} - \text{Cable Loss}$

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	30dB Attenuator	ATSI150-4-40	11300100204204	2012-6-4	2013-6-4
Forstar	Forstar RF Cable	002	1034	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

## Test Procedure



The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. External attenuation Loss is 40dB, Cable Loss is about 2dB.

## Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

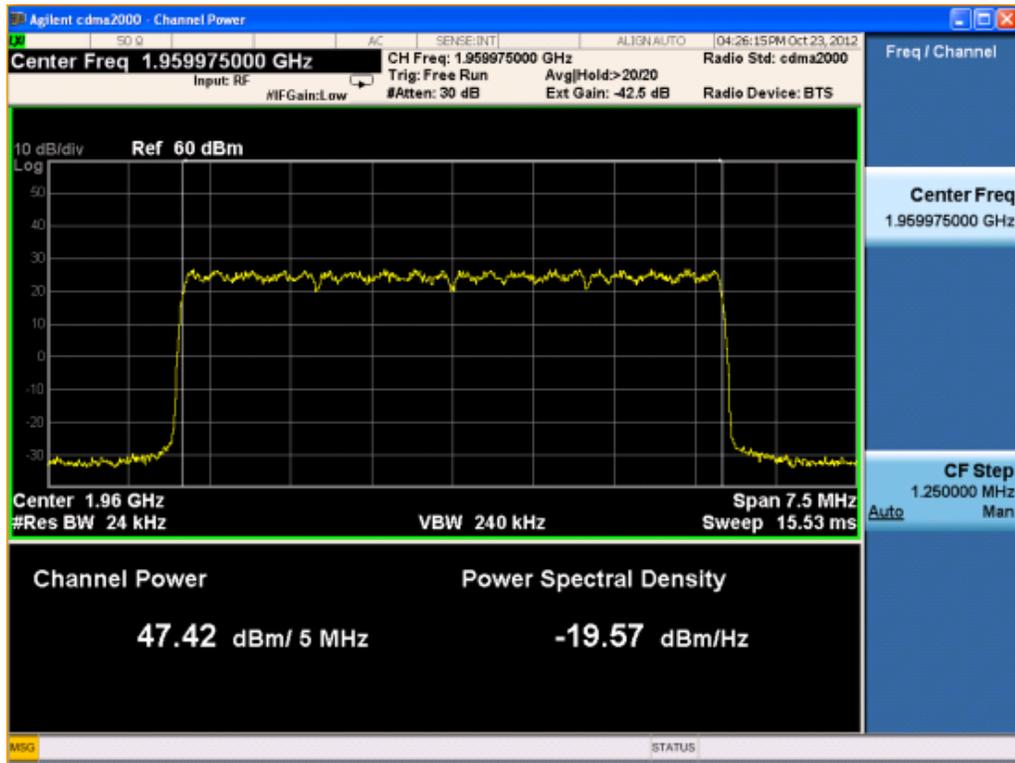
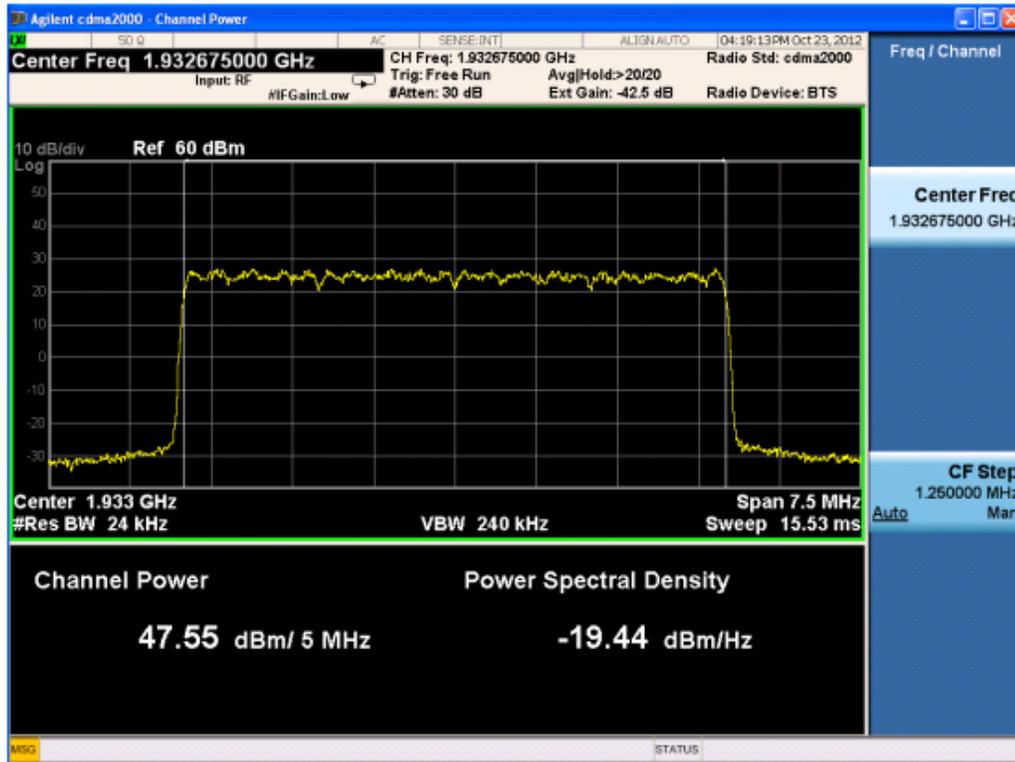
**Test Result:** Pass

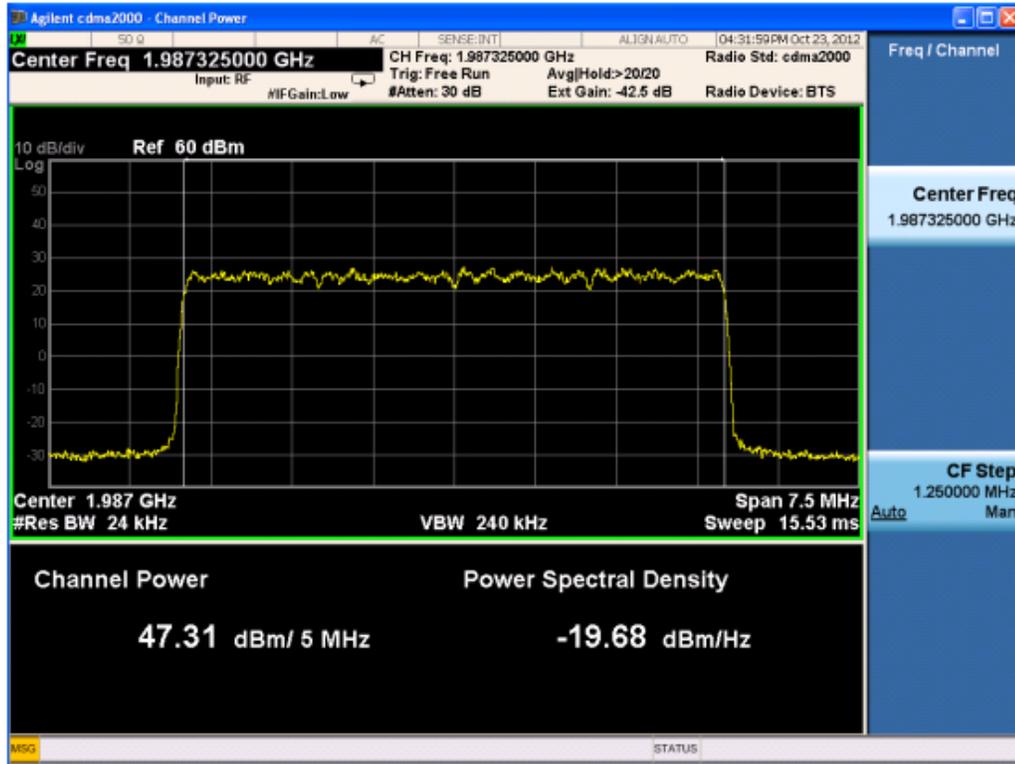
**Test Mode:** Transmitting CDMA

## Test Data:

### Four carriers

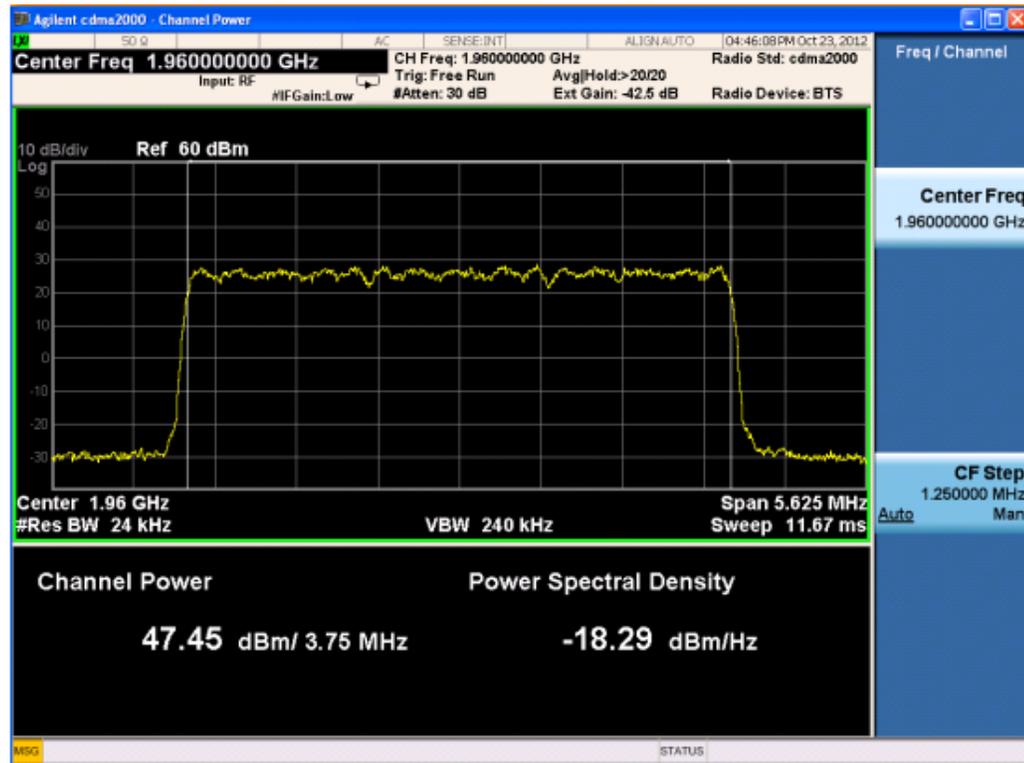
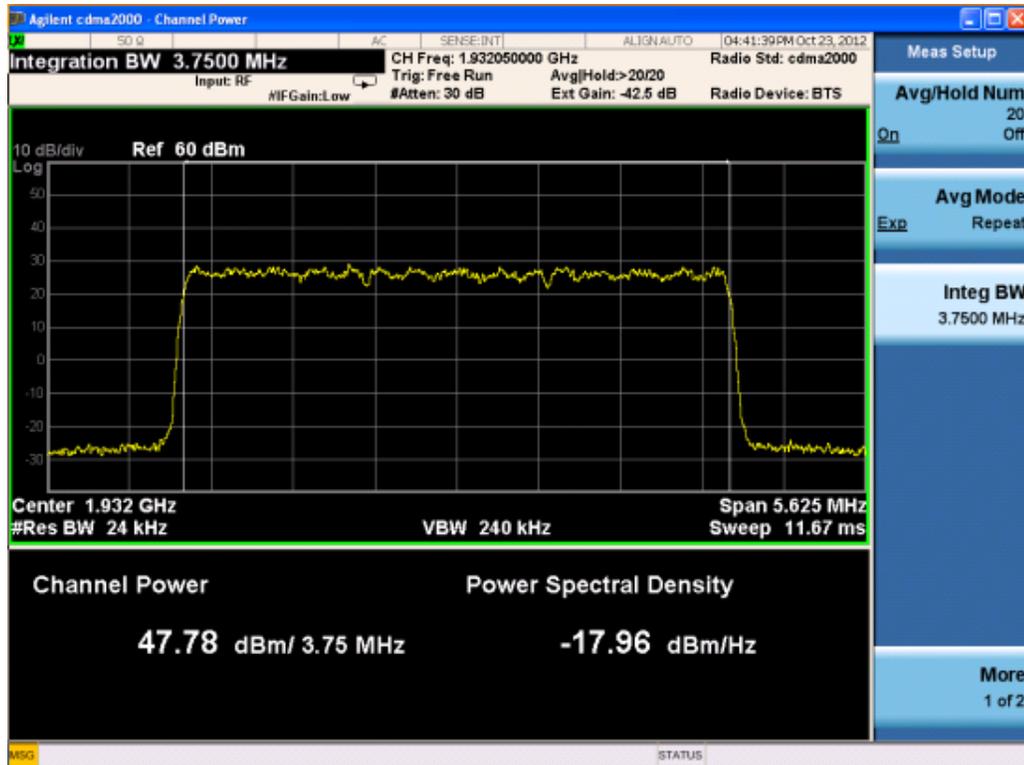
Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1932.675	1930.8/1932.05/1933.3/1934.55	47.55
1959.975	1958.1/1959.35/1960.6/1961.85	47.42
1987.325	1985.45/1986.7/1987.95/1989.2	47.31

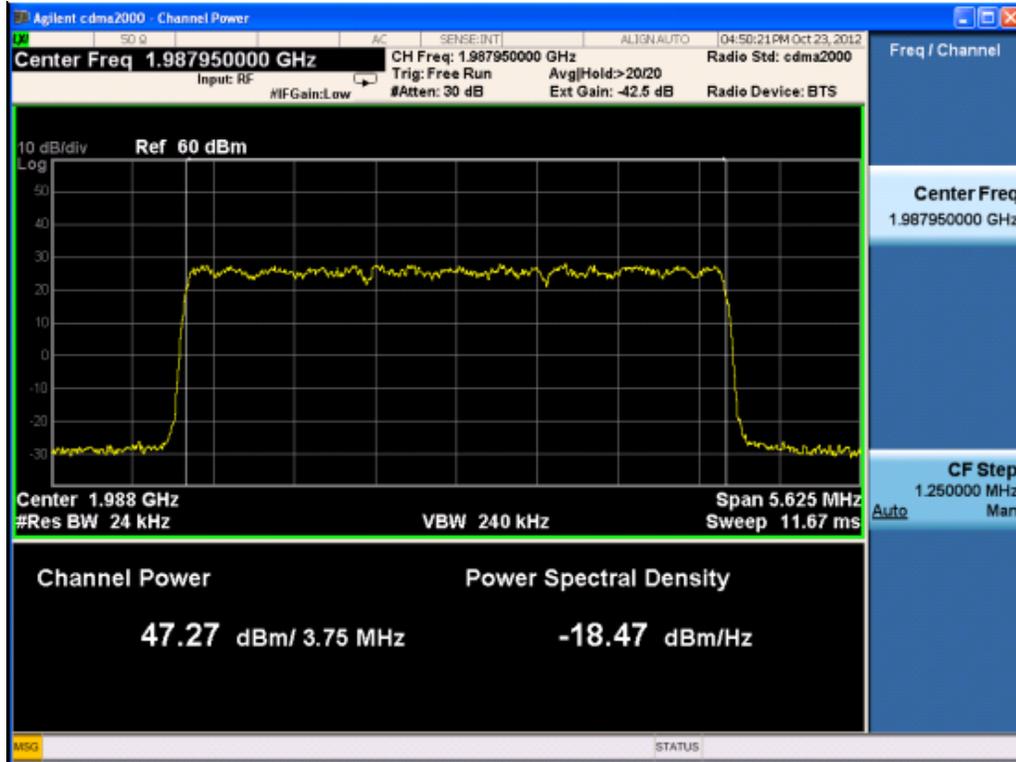




**Three carriers**

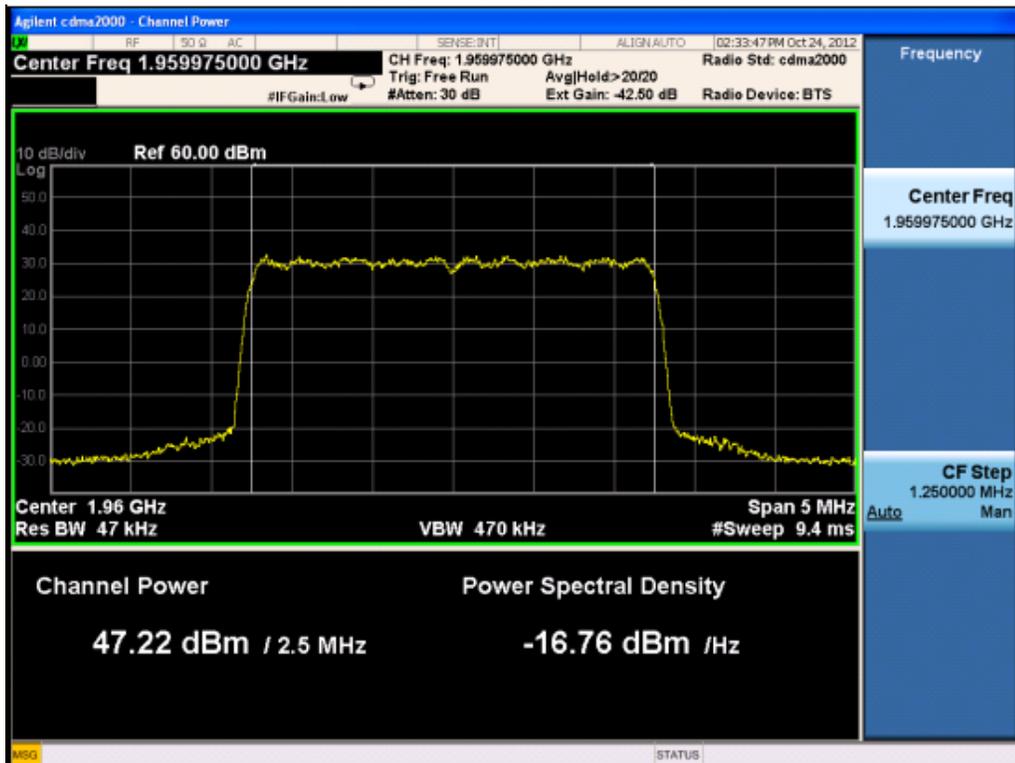
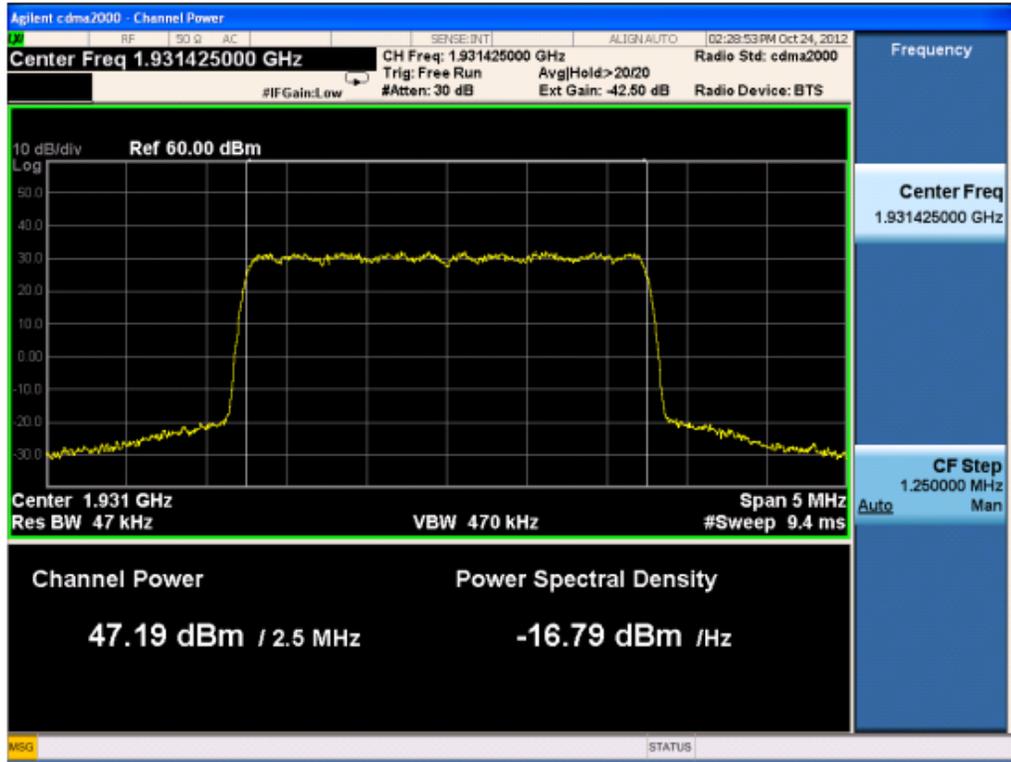
Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1932.05	1930.8/1932.05/1933.3	47.78
1960	1958.75/1960/1961.25	47.45
1987.95	1986.7/1987.95/1989.2	47.27

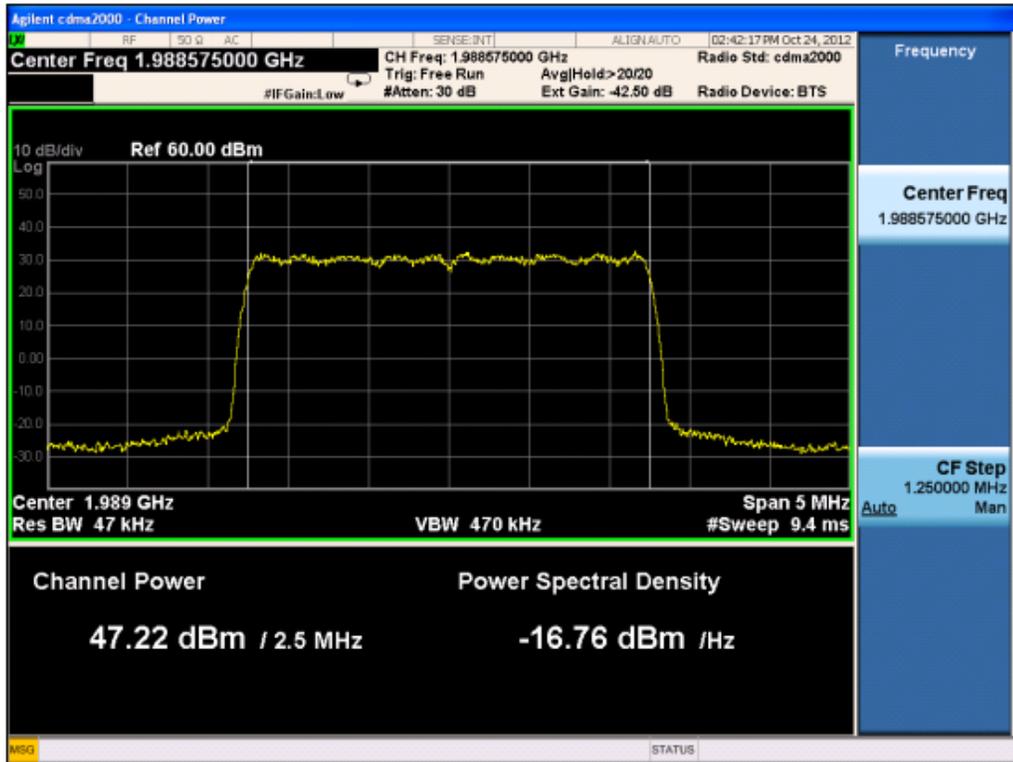




**Two carriers**

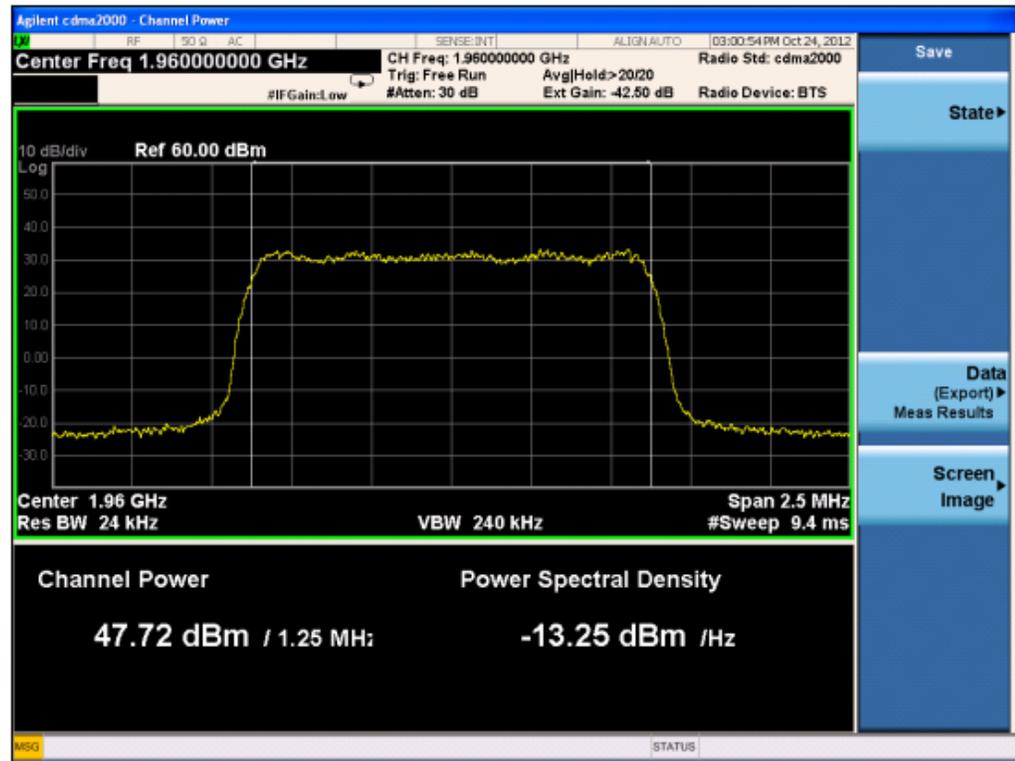
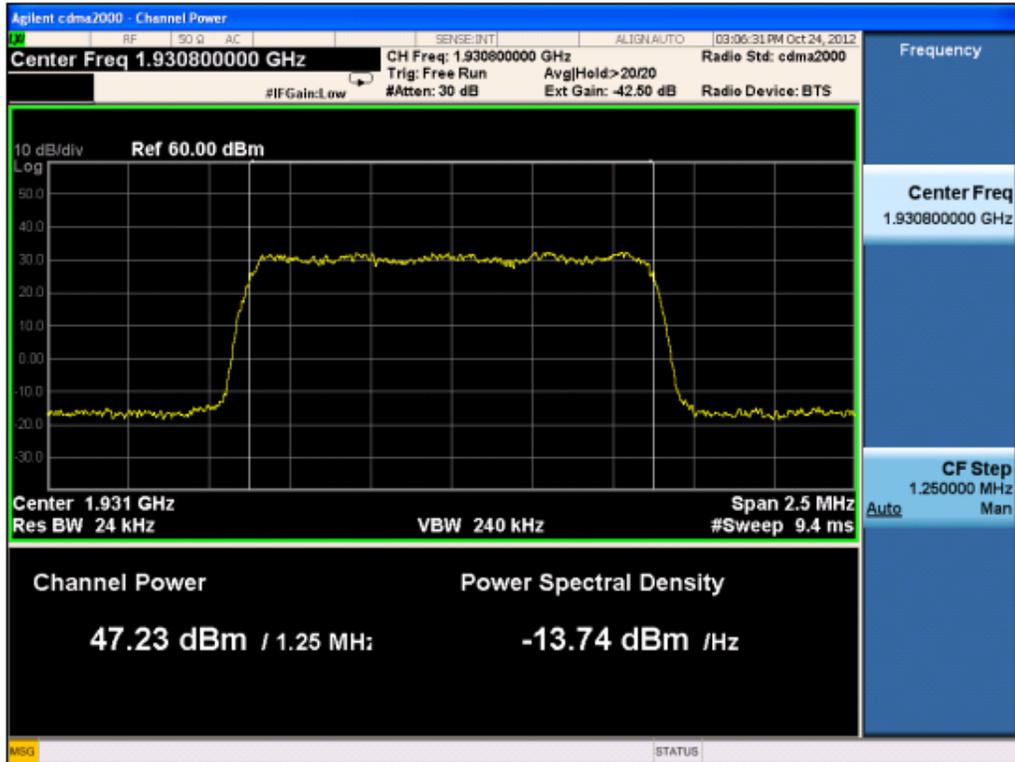
Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1931.425	1930.8/1932.05	47.19
1959.975	1959.35/1960.6	47.22
1988.575	1987.95/1989.2	47.22





**One carrier**

Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1930.8	1930.8	47.23
1960	1960	47.72
1989.2	1989.2	47.49





# 3.2 RF EXPOSURE

**Applicable standard:** FCC §2.1091 and §1.1037

## Limit

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated. Limits for Maximum Permissible Exposure (MPE)

<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

## Test Data

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = EIRP / 4\pi R^2$$

Where: S = power density

EIRP = equivalent isotropically radiated power=ERP+2.15dB

R = distance to the center of radiation of the antenna=[(ERP+2.15 dB)/ 4πS]<sup>1/2</sup>

Maximum EIRP, In general, the equivalent isotropically radiated power (EIRP) of base transmitters and cellular repeaters must not exceed 1640 Watts.

Frequency is between 1500MHz and 100,000MHz, and the Maximum S=1.0mW/cm<sup>2</sup>, so R=3.61m.

This equipment should be installed and operated with minimum distance 3.61m between the radiator& your body.

**Test Result:** pass

### 3.3 MODULATION CHARACTERISTIC

**Applicable Standard:** FCC §2.1047

#### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	005	1054	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

#### Test Procedure

CDMA digital mode is used by EUT.

#### Test Data Environmental Conditions

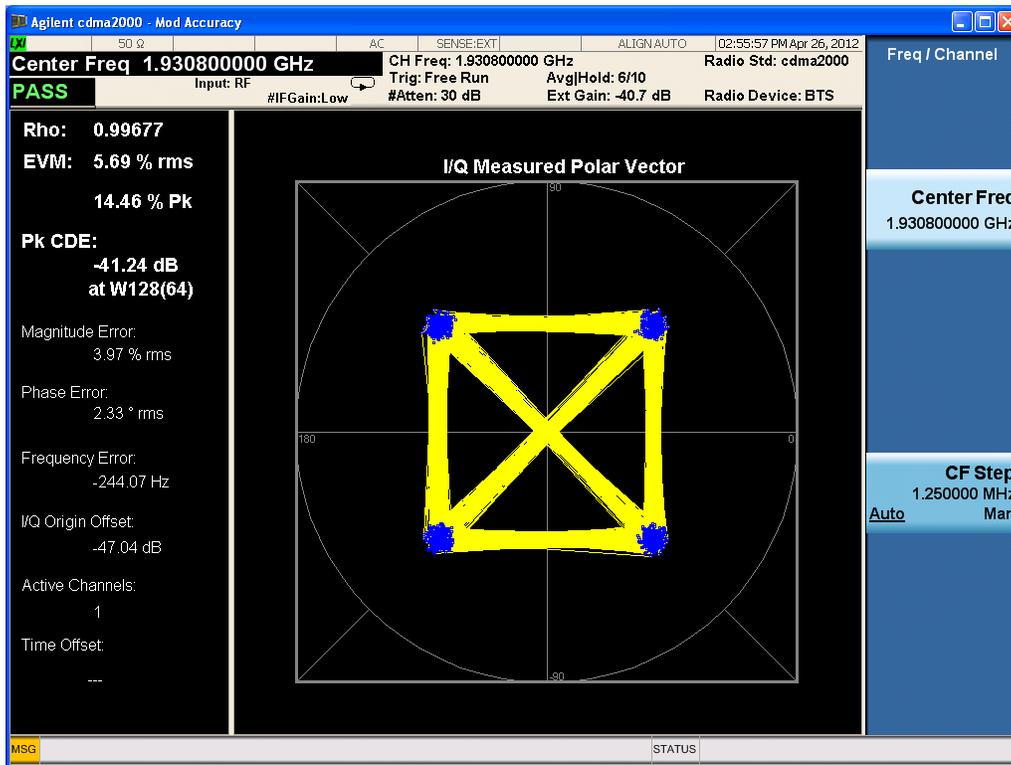
Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

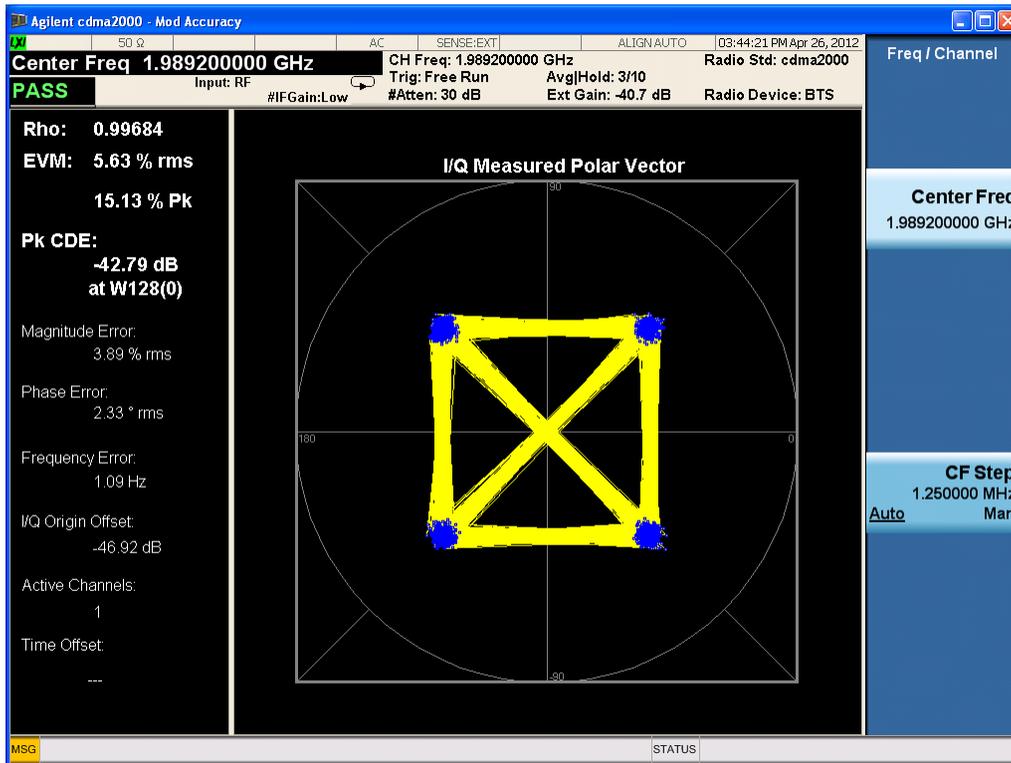
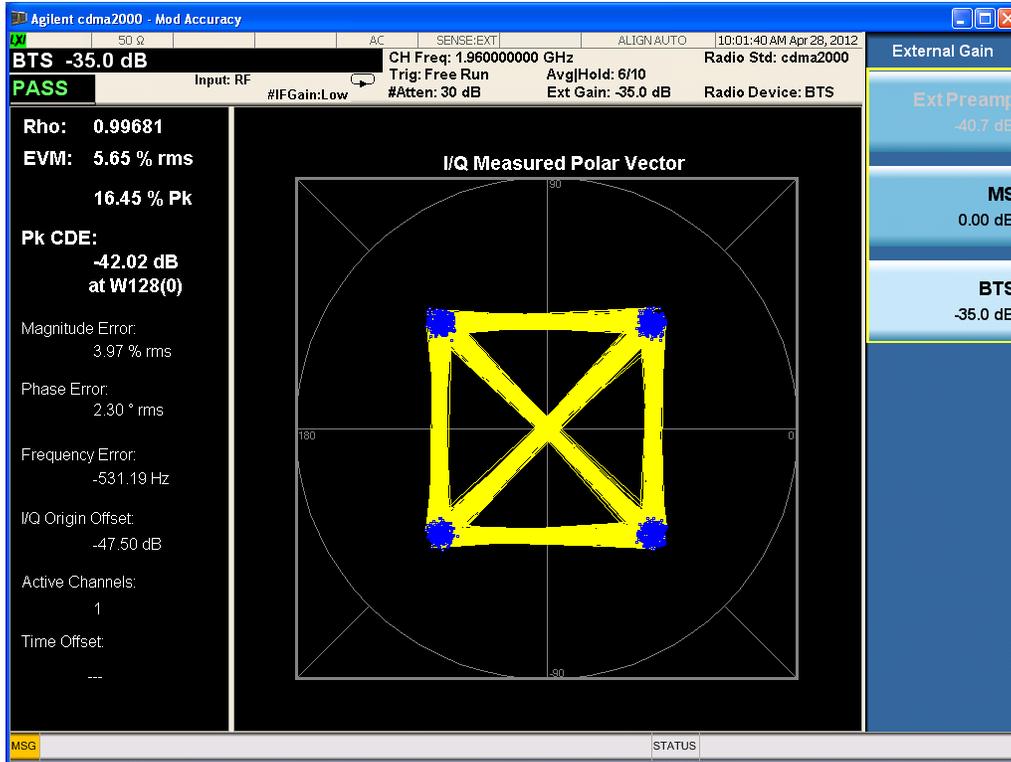
**Test Result:** Pass

**Test Mode:** Transmitting CDMA

### Test Data:

Frequency (MHz)	Rho
1930.8	0.99677
1960	0.99681
1989.2	0.99684





# 3.4 SPURIOUS RADIATED EMISSIONS

**Applicable Standard:** FCC CFR 47, §2.1053

## Test Equipment List and Details

Manufacturer	Equipment	Model	Serial Number	Last Cal.	Cal. Interval
R&S	SIGNAL GENERATOR	SMR20	A00017351	2012-9-26	1 year
Albatross	Anechoic Chamber	3m Site	A00017354	2012-10-29	1 year
R&S	EMI Test Receiver	ESIB26	100058	2012-10-29	1 year
R&S	Ultra Breitband Antennas	HL562	100022	2012-7-29	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100032	2012-7-29	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100446	2012-7-29	1 year
SCHWARZ-BECK	Biconical Antenna	VUBA9117	9117-122	2012-7-29	1 year

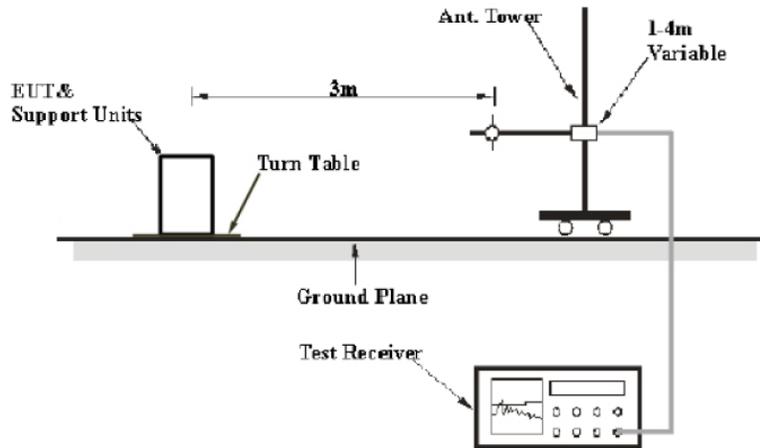
**\*statement of traceability:** ZTE Corporation Testing lab attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiated emissions measurement at the EMC lab of ZTE Corp. is 3.6dB.

### EUT Setup



The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the FCC part 2.1053. The specification used was the FCC 2.1053 limits.

## Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TX pwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 43+10 Lg P (power out in Watts)

The resolution bandwidth of the spectrum analyzer was set at 100KHz for 30MHz to 1GHz scanning, set at 1MHz or 3MHz for 1GHz to 20GHz scanning.

## Test Results Summary: PASS

## Environmental Conditions

Temperature:	26°C
Relative Humidity:	60 %
ATM Pressure:	1009 mbar

## Test data

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (GHz)	Amp. (dB $\mu$ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
63.046092	26.01	V	-70.1	-27.24	0.6	-97.94	2.15	-100.09	-13	87.09
634.549098	26.43	V	-69.68	-1.09	2.1	-72.87	2.15	-75.02	-13	62.02
974.729459	31.16	V	-72.63	-2.82	2.6	-78.05	2.15	-80.2	-13	67.2
1384.76954	46.62	V	-60.9	4.25	3.1	-59.75	2.15	-61.9	-13	48.9
2991.98397	58.48	V	-52.49	7.95	4.6	-49.14	2.15	-51.29	-13	38.29
169.95992	23.09	H	-80.17	-3.24	1.1	-84.51	2.15	-86.66	-13	73.66
607.334669	27.78	H	-73.12	-1.39	2	-76.51	2.15	-78.66	-13	65.66
992.224449	31.09	H	-72.3	-2.59	2.7	-77.59	2.15	-79.74	-13	66.74
1388.77756	46.41	H	-62.22	4.25	3.1	-61.07	2.15	-63.22	-13	50.22
1981.96393	90.64	H	-18.3	6.55	3.8	-15.55	2.15	-17.7	-13	4.7
2963.92786	57.49	H	-48.71	7.95	4.6	-45.36	2.15	-47.51	-13	34.51

### Radiation emission spurious below 3GHz

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (GHz)	Amp. (dB $\mu$ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
3953.90782	49.47	V	-46.64	7.75	5.3	-44.19	2.15	-46.34	-13	33.34
5276.55311	45.53	V	-50.58	8.55	6.2	-48.23	2.15	-50.38	-13	37.38
5941.88377	58.8	V	-44.99	9.05	6.6	-42.54	2.15	-44.69	-13	31.69
9755.51102	54.47	V	-53.05	9.95	9	-52.1	2.15	-54.25	-13	41.25
13282.5651	59.36	V	-42.38	11.85	10.2	-40.73	2.15	-42.88	-13	29.88
17933.8677	72.31	V	-38.66	8.95	12.2	-41.91	2.15	-44.06	-13	31.06
3961.92385	50.92	H	-52.34	7.75	5.3	-49.89	2.15	-52.04	-13	39.04
5268.53707	45.53	H	-55.37	8.55	6.2	-53.02	2.15	-55.17	-13	42.17
5941.88377	54.63	H	-48.76	9.05	6.6	-46.31	2.15	-48.46	-13	35.46
9843.68738	53.43	H	-55.2	9.95	8.9	-54.15	2.15	-56.3	-13	43.3
13348.6974	58.86	H	-50.08	11.85	10.2	-48.43	2.15	-50.58	-13	37.58
17867.7355	72.1	H	-34.1	8.95	12.2	-37.35	2.15	-39.5	-13	26.5

### Radiation emission spurious above 3GHz

# 3.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

**Applicable Standard:** FCC§2.1051, §24.238

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified.

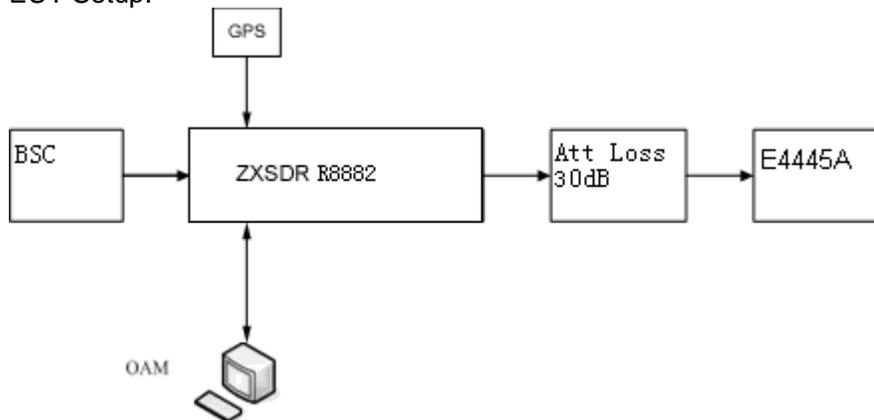
## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	005	1054	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

## Test Procedure

EUT Setup:



REMARKS: Attenuator loss (dB)=30dB, Cable Loss (dB)=5dB.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100KHz for 30MHz to 1GHz scanning, set at 1MHz for 1GHz to 5GHz scanning, set at 1MHz for 5GHz to

10GHz scanning, set at 1MHz for 10GHz to 20GHz scanning. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

### Test Data Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

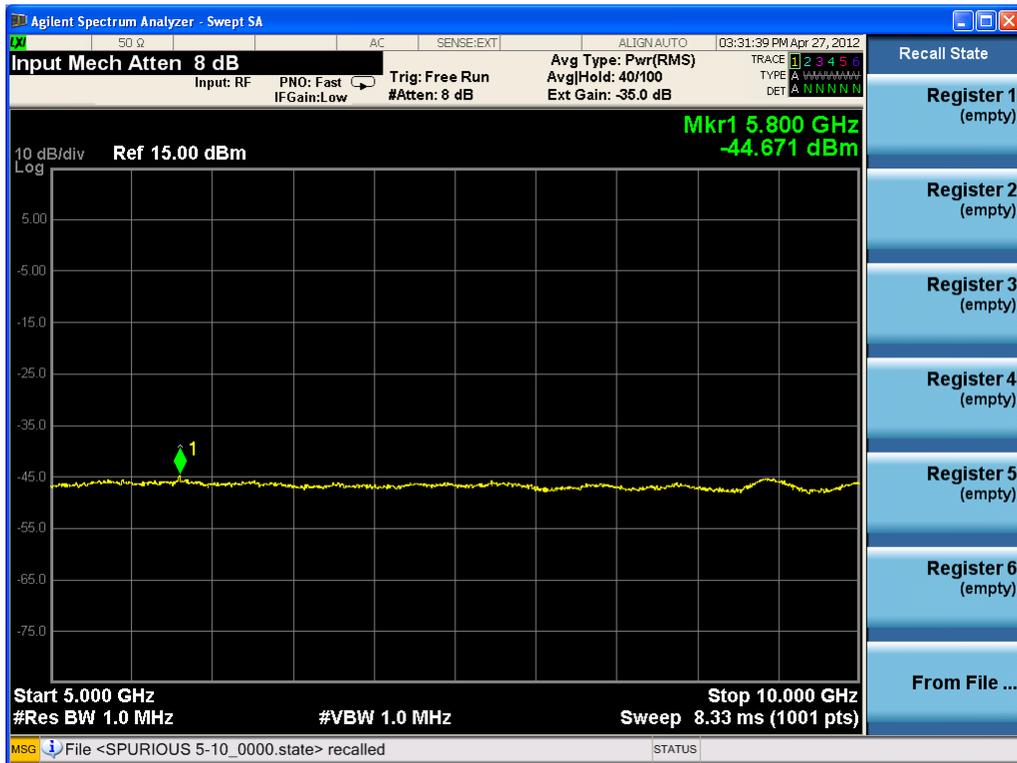
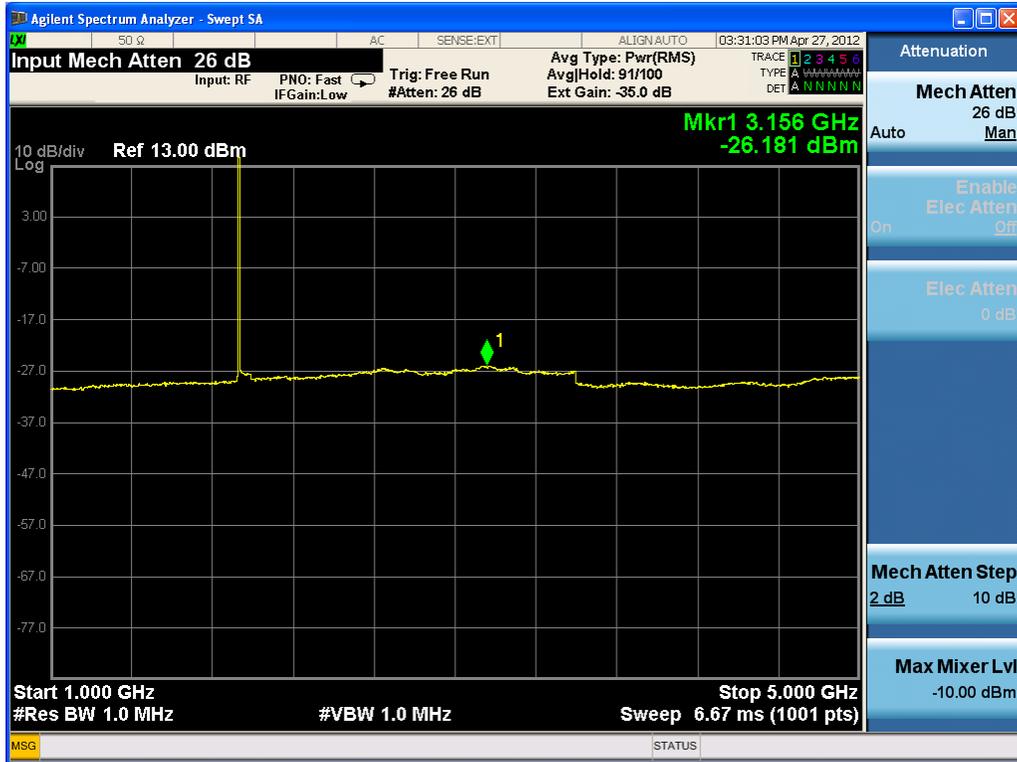
**Test Result:** Pass

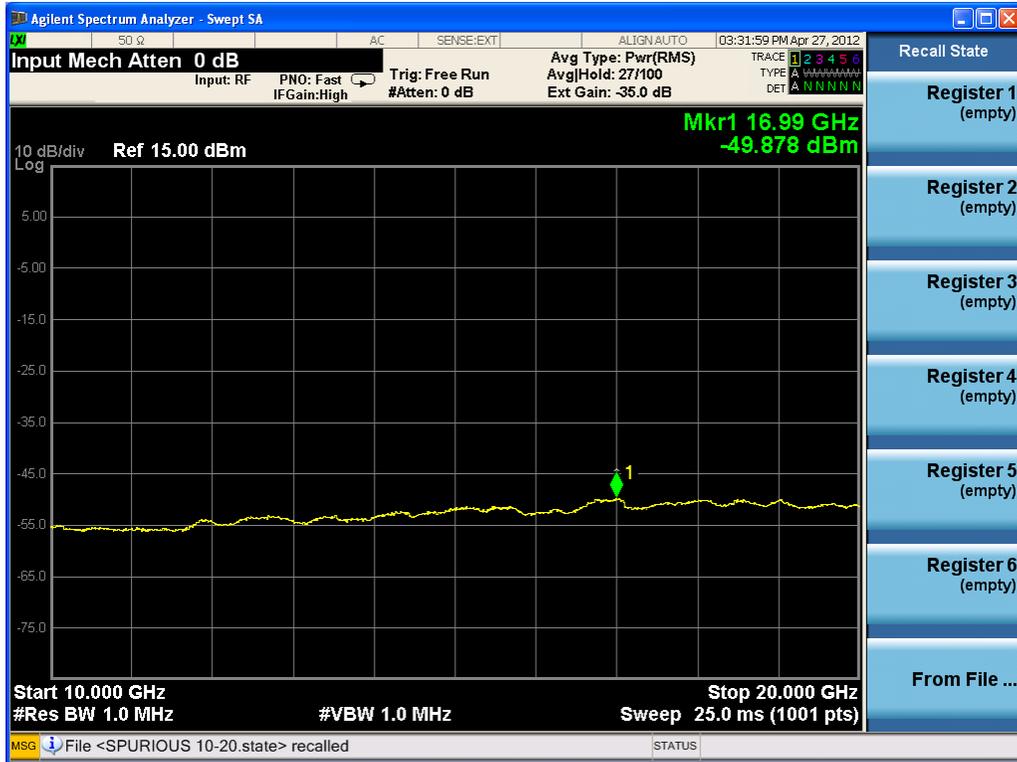
**Test Mode:** Transmitting CDMA

### Test Data:

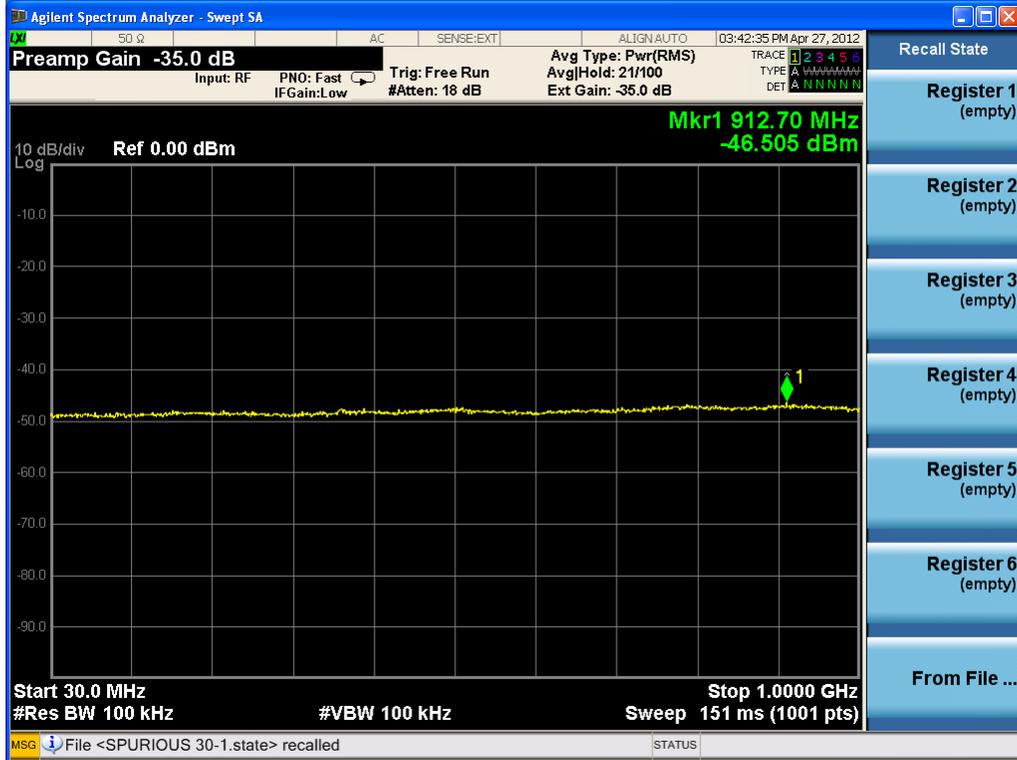
Four Carriers (working in bottom frequency)

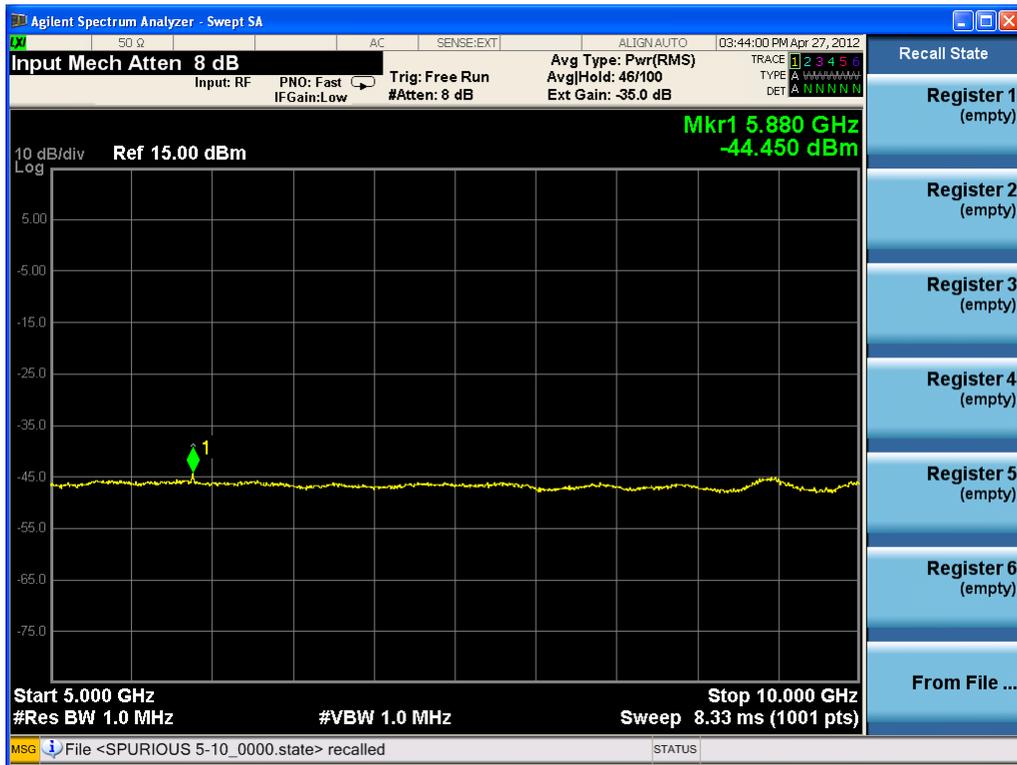
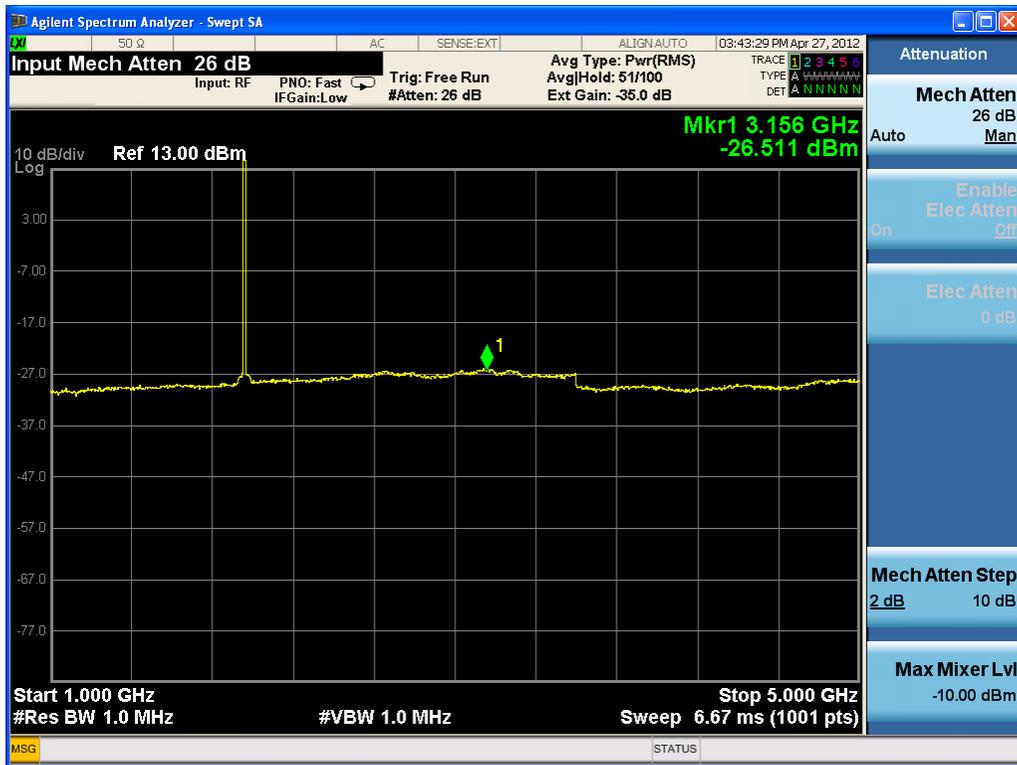


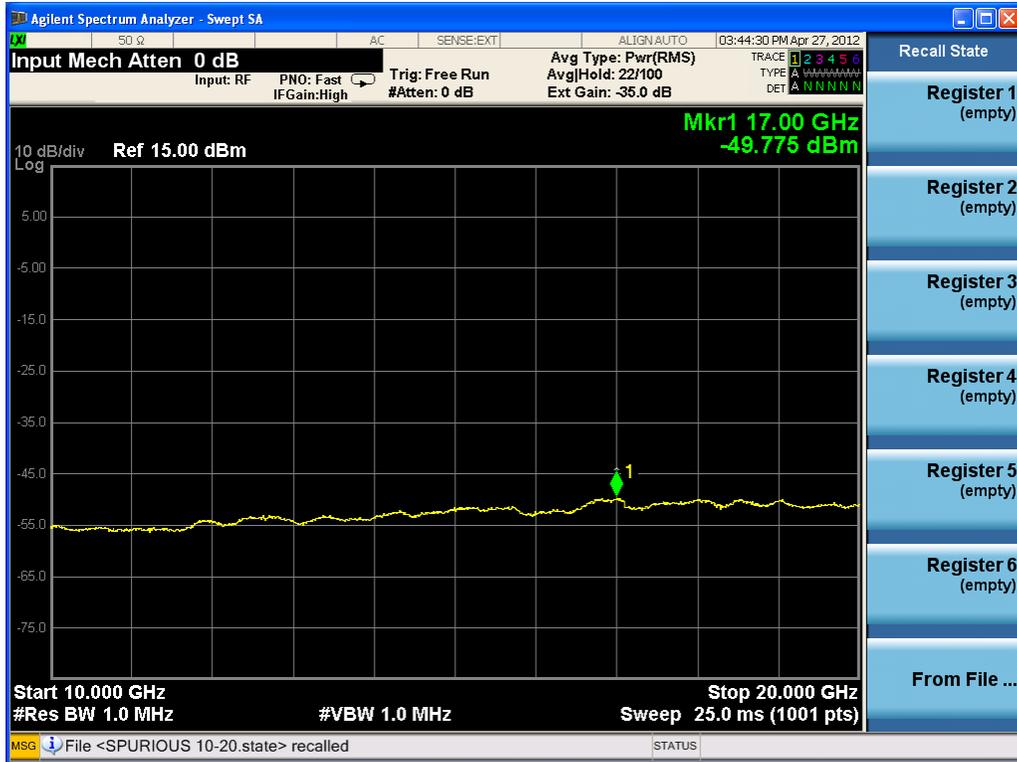




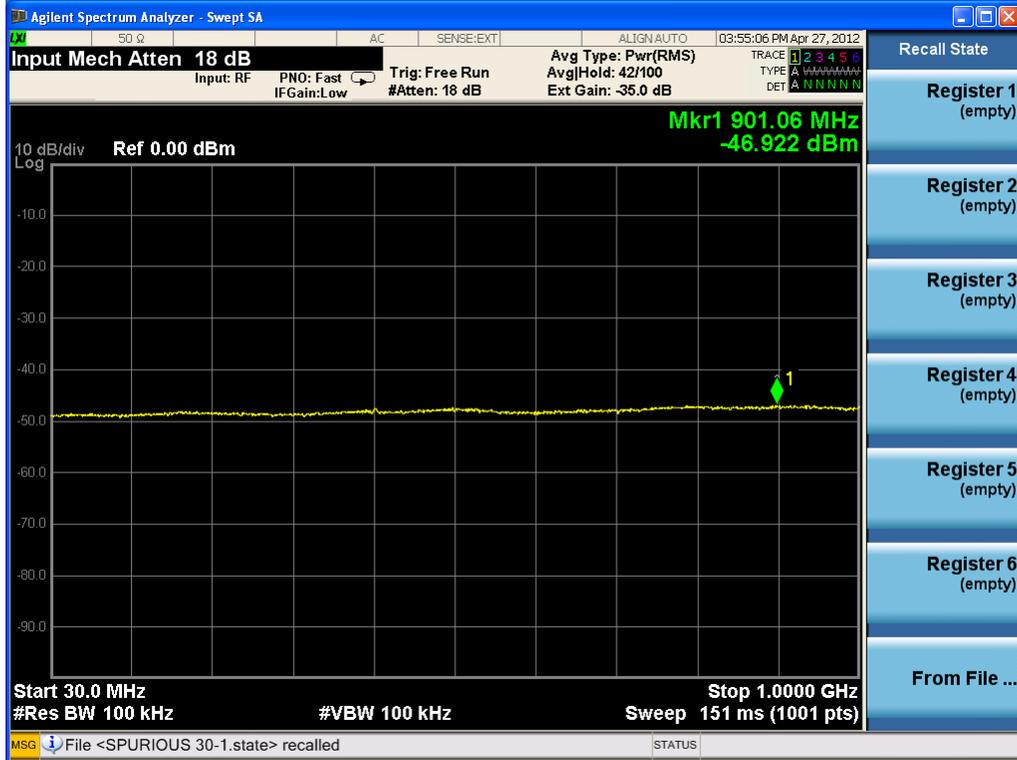
Four carriers (working in middle frequency)

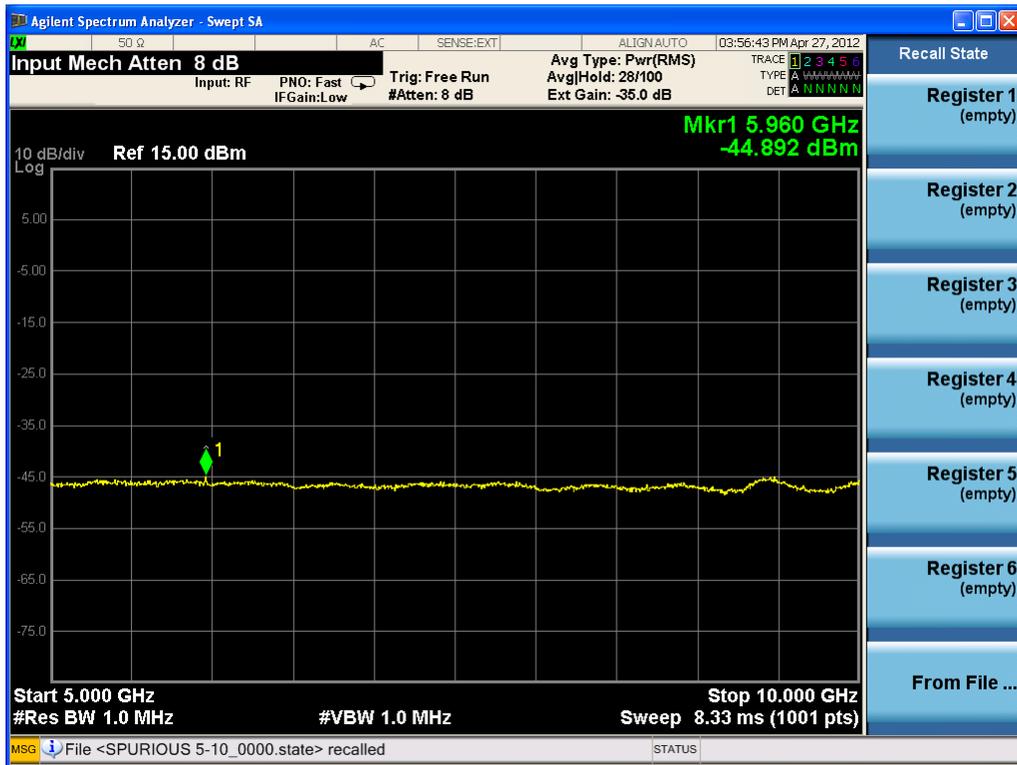
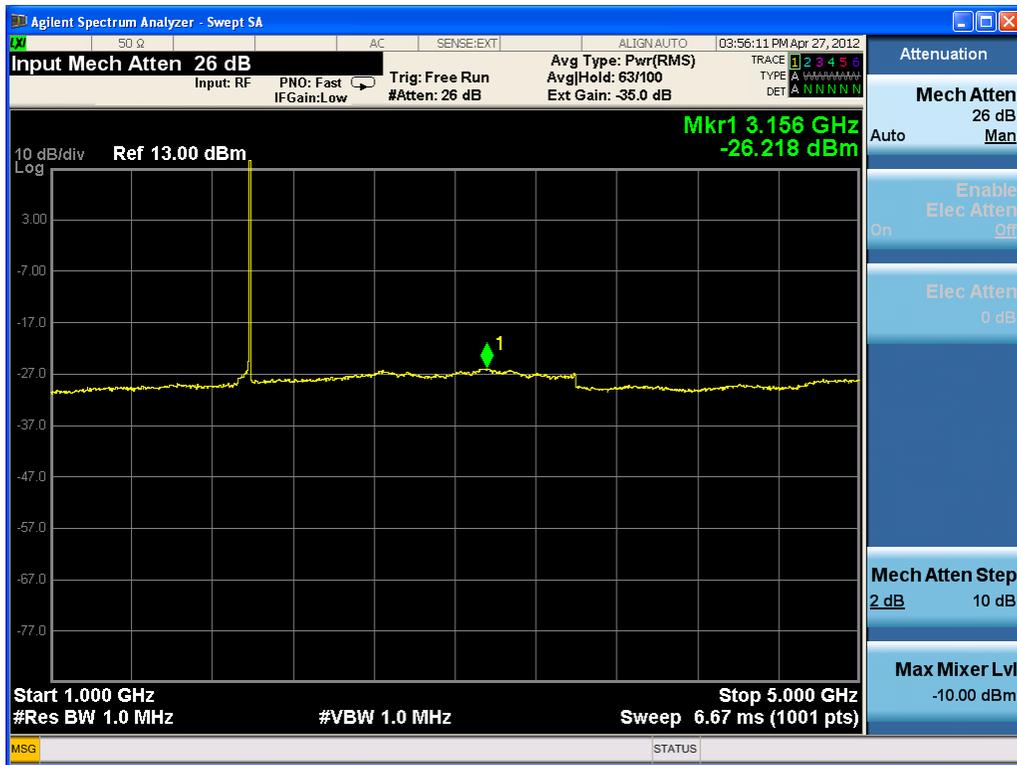


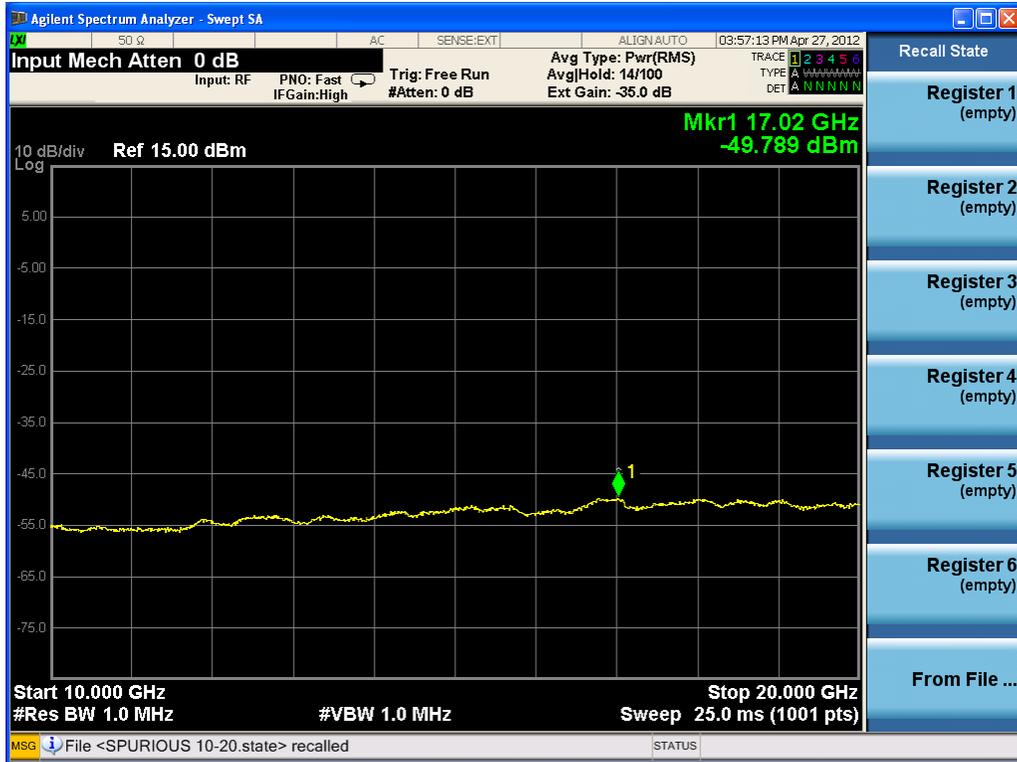




Four Carriers (working in top frequency)

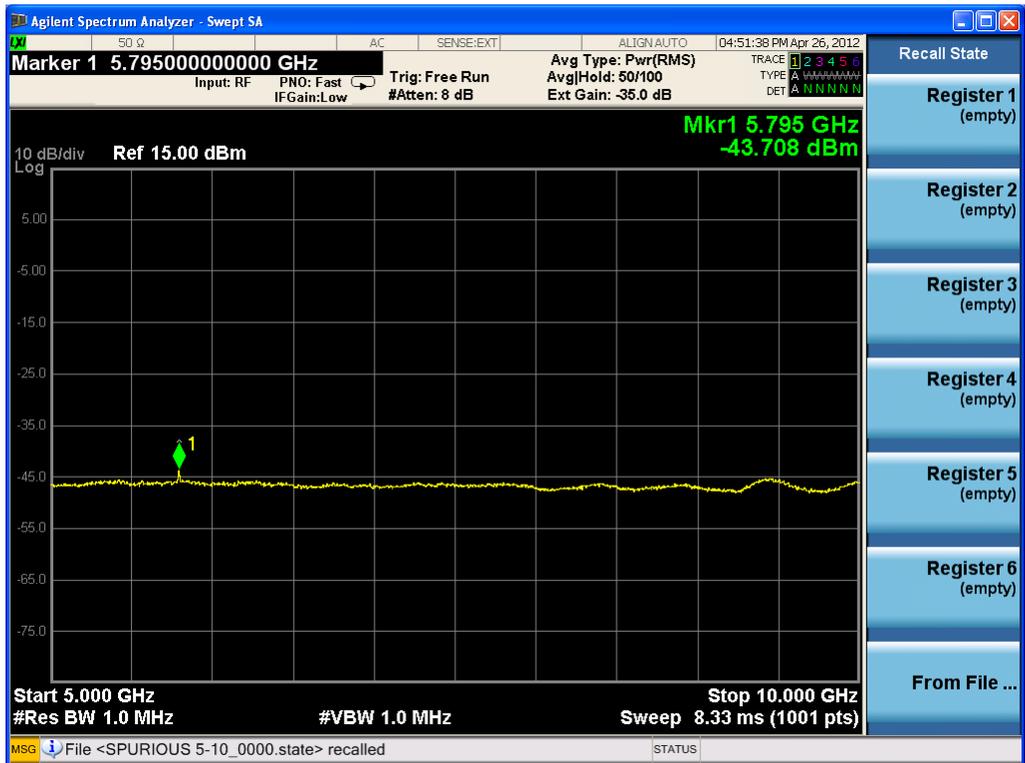
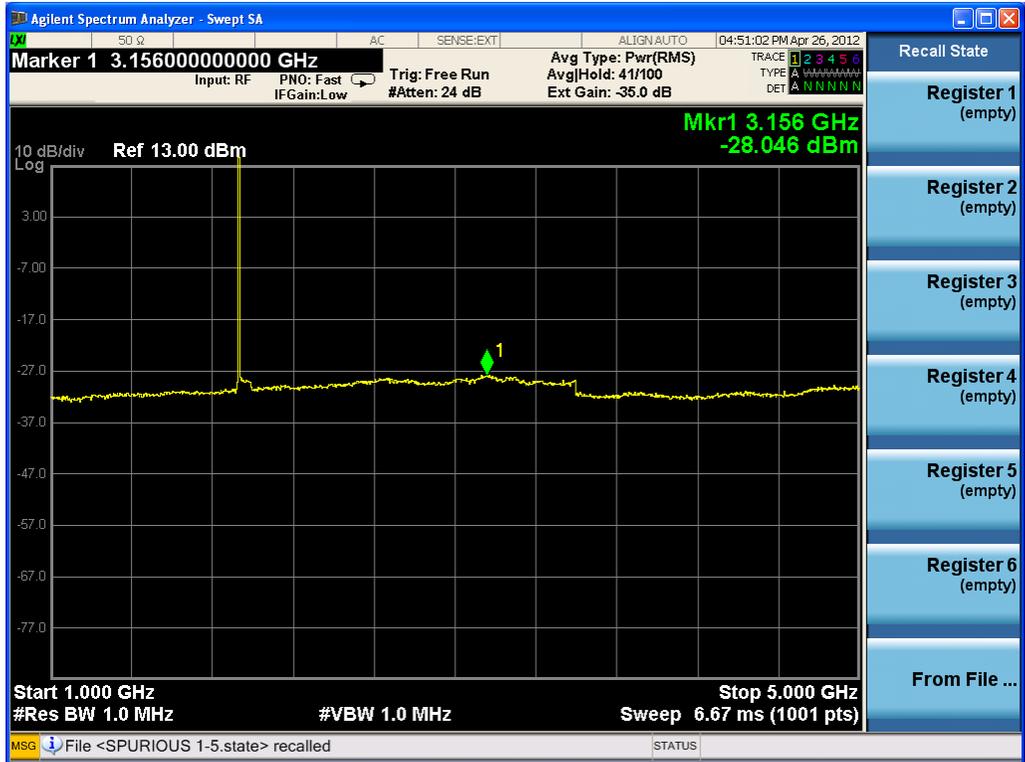


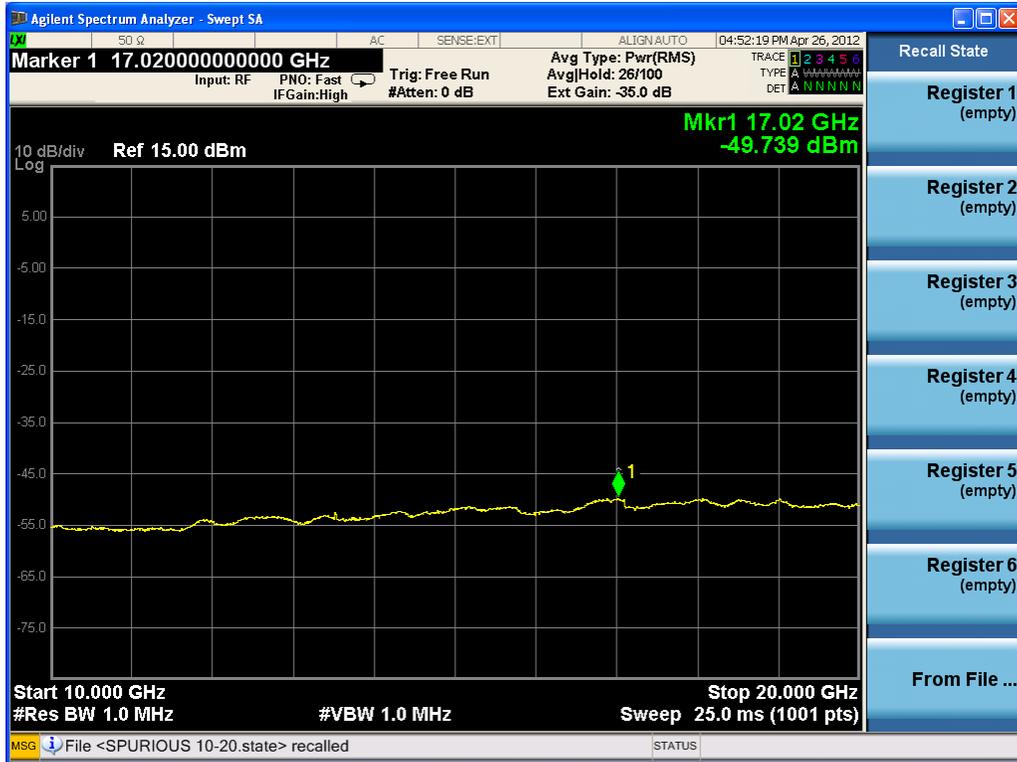




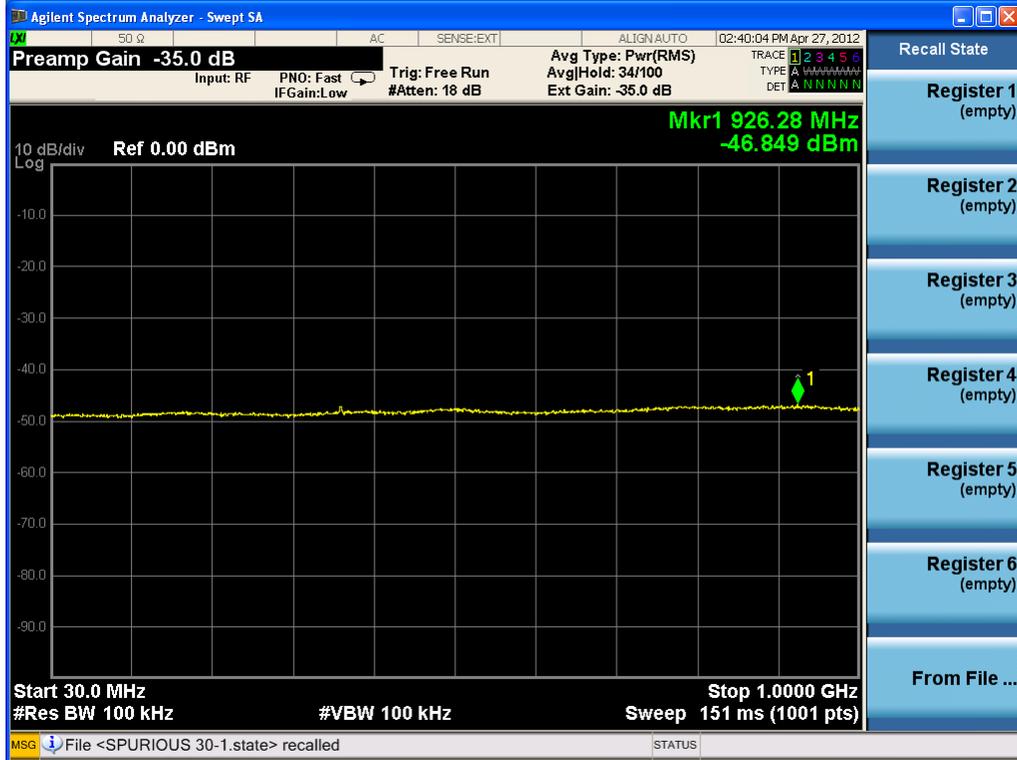
Three carriers (working in bottom frequency)

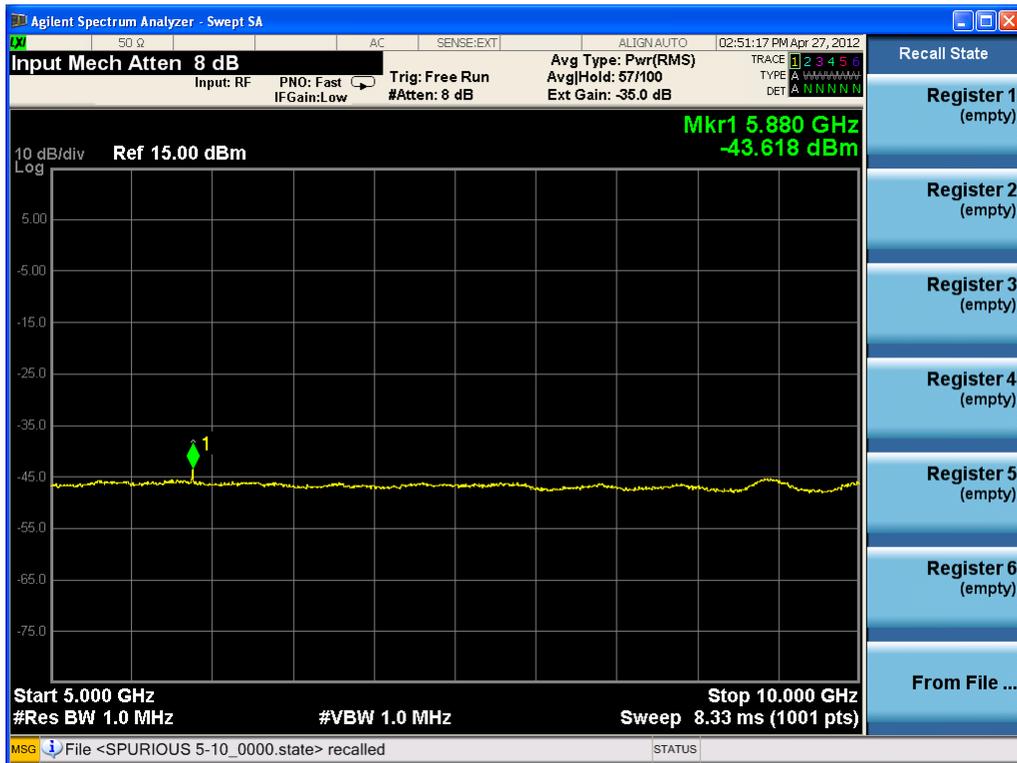
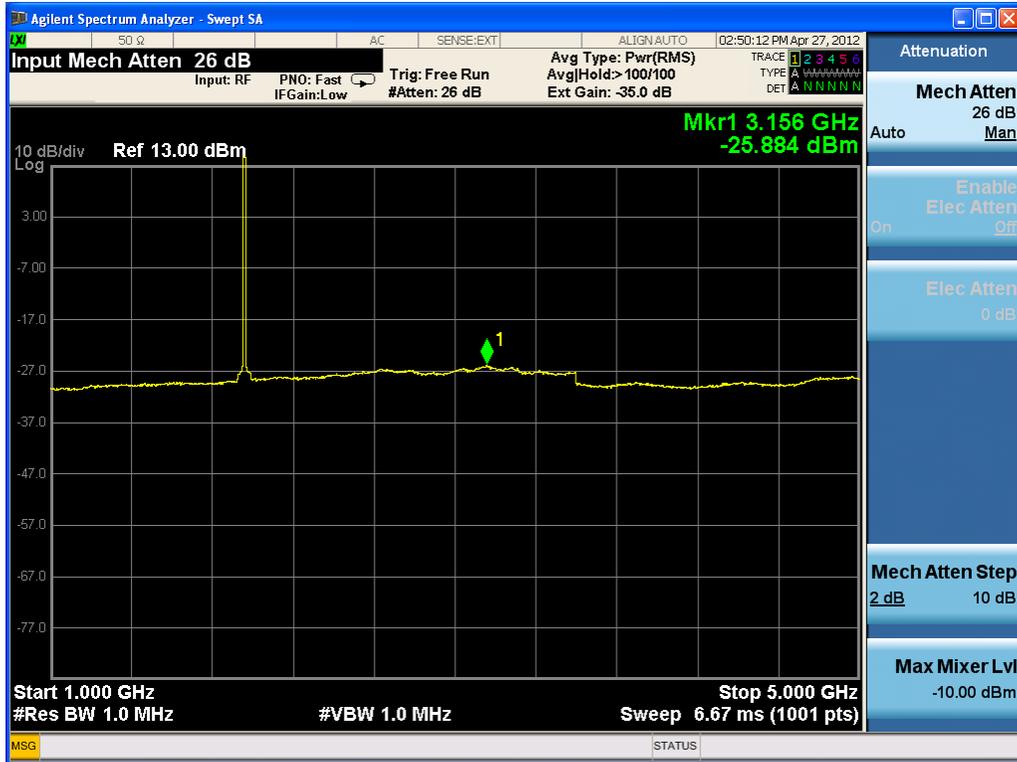




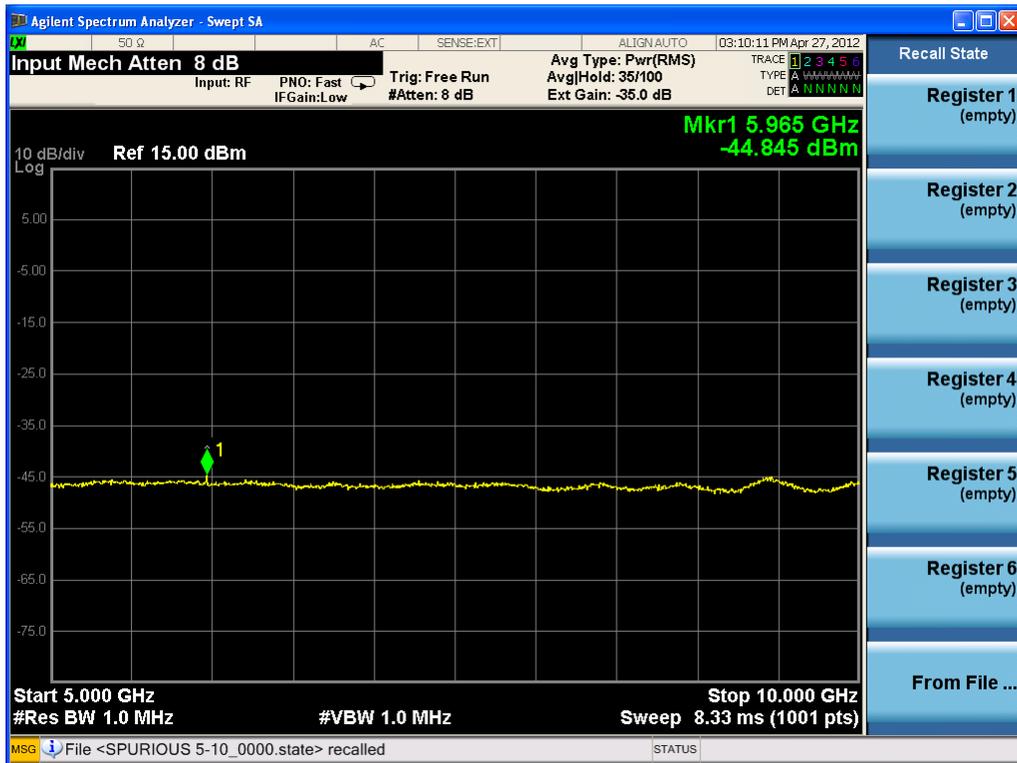
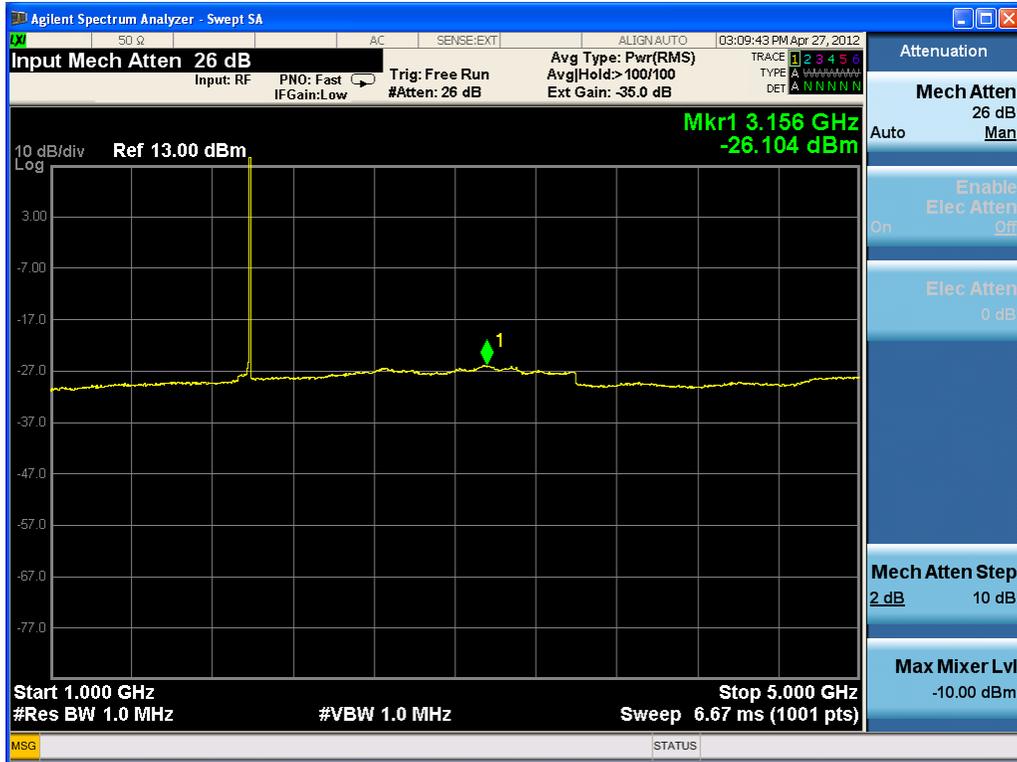


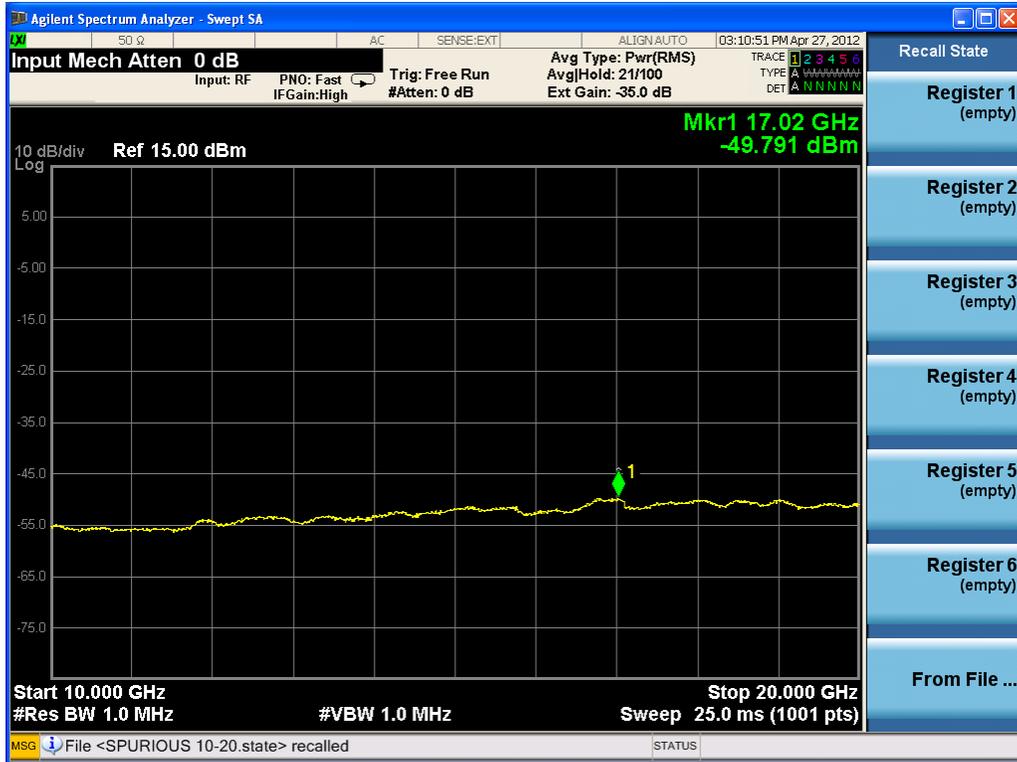
Three carriers (working in middle frequency)



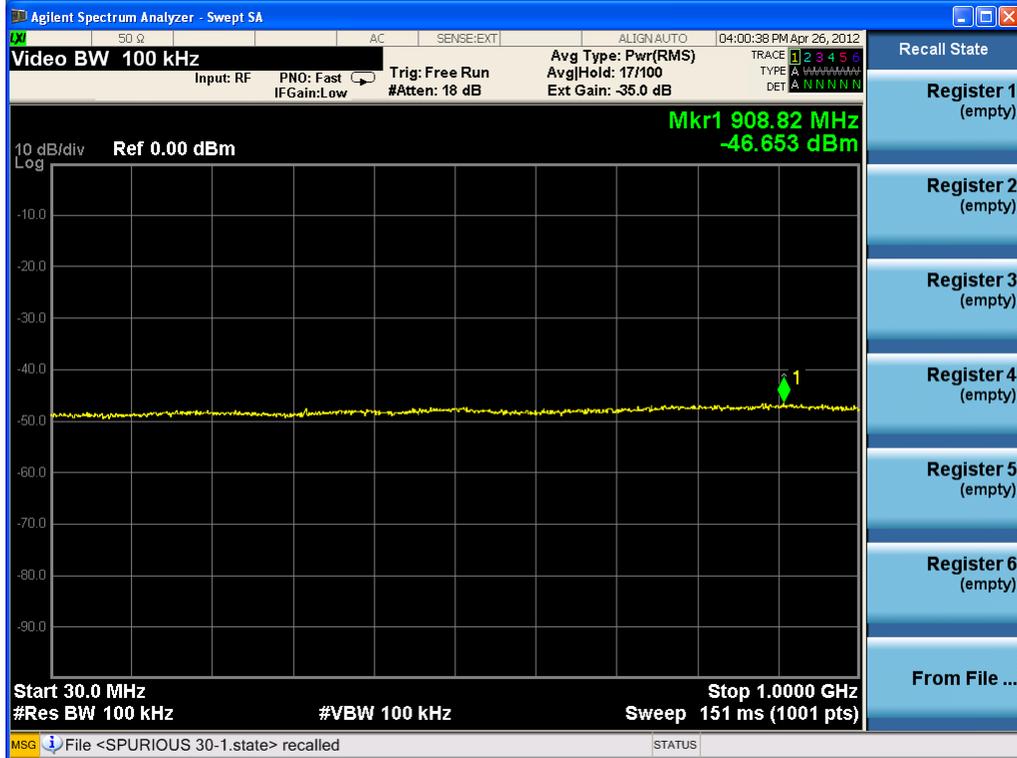


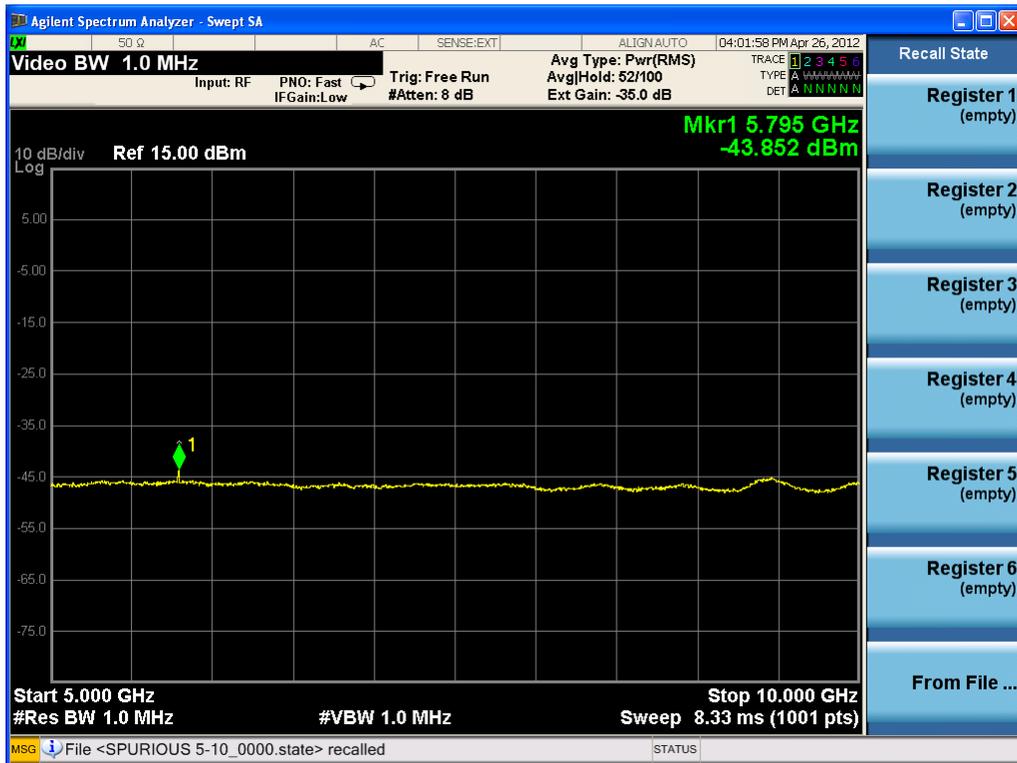
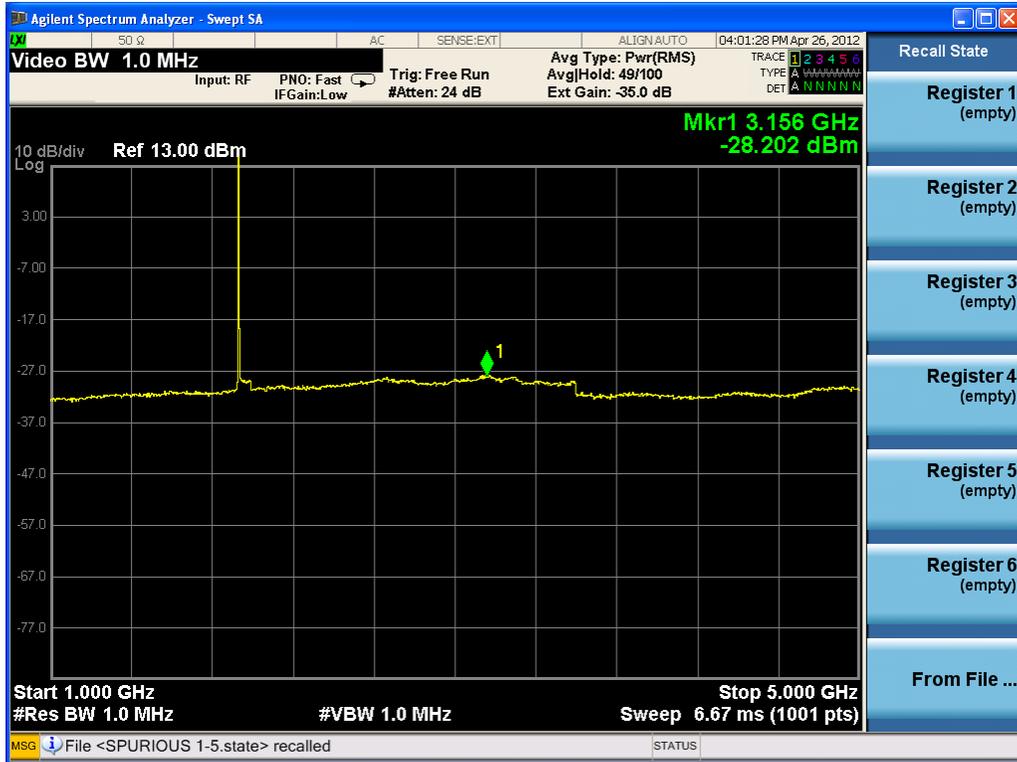






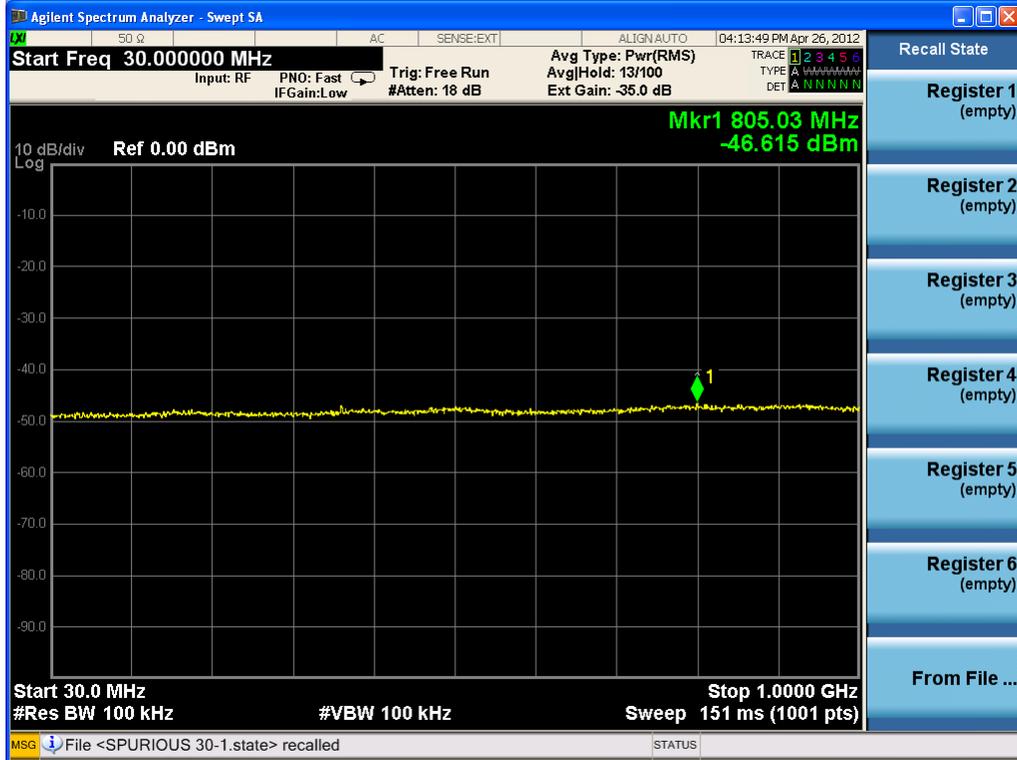
Two carriers (working in bottom frequency)

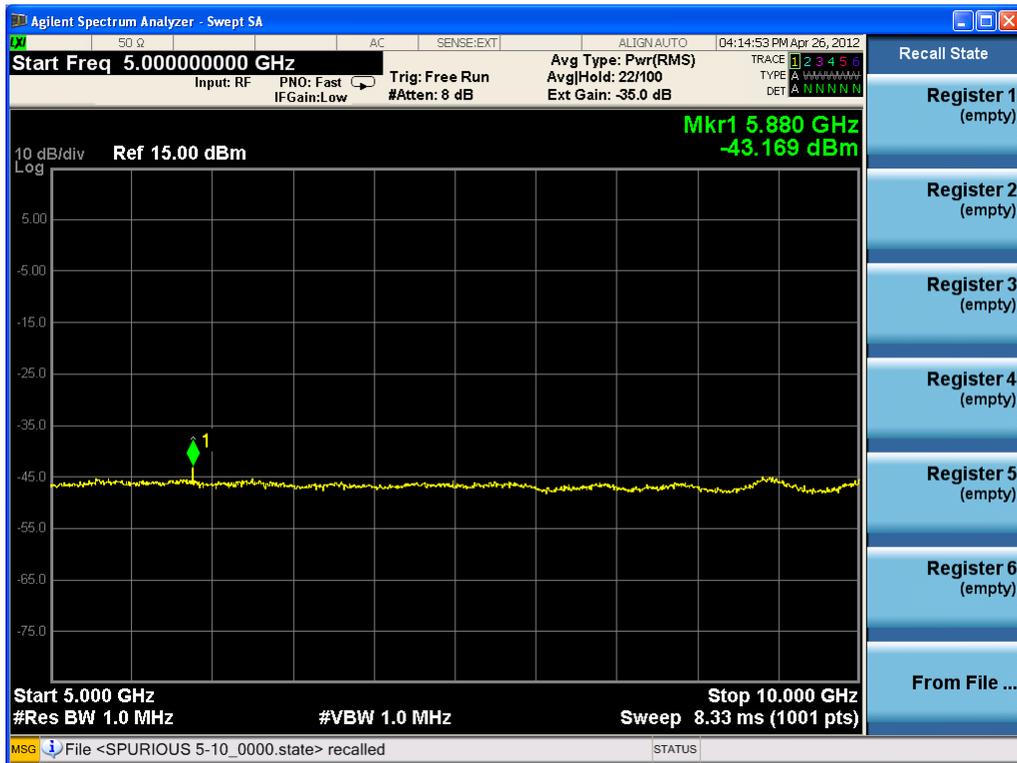
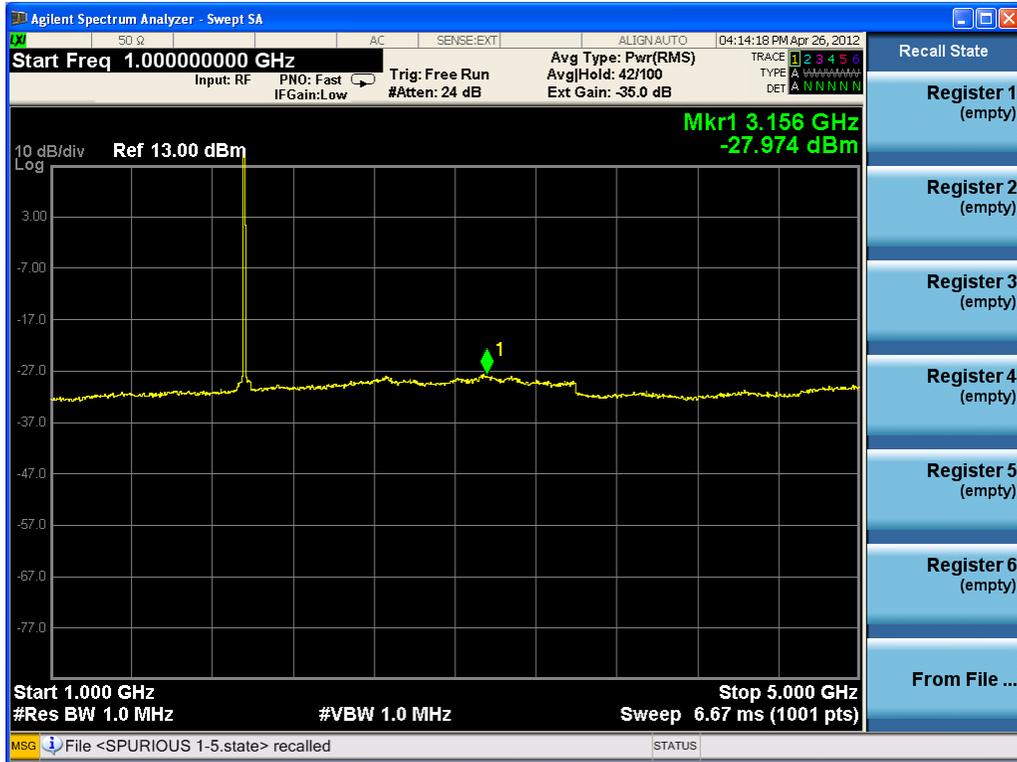


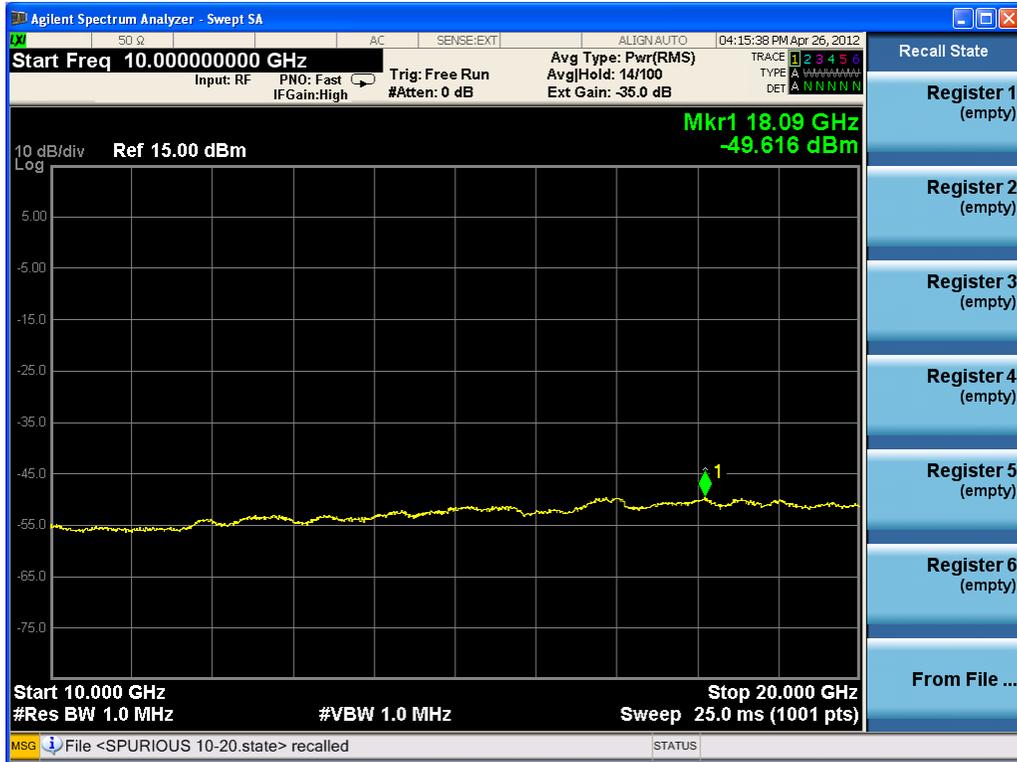




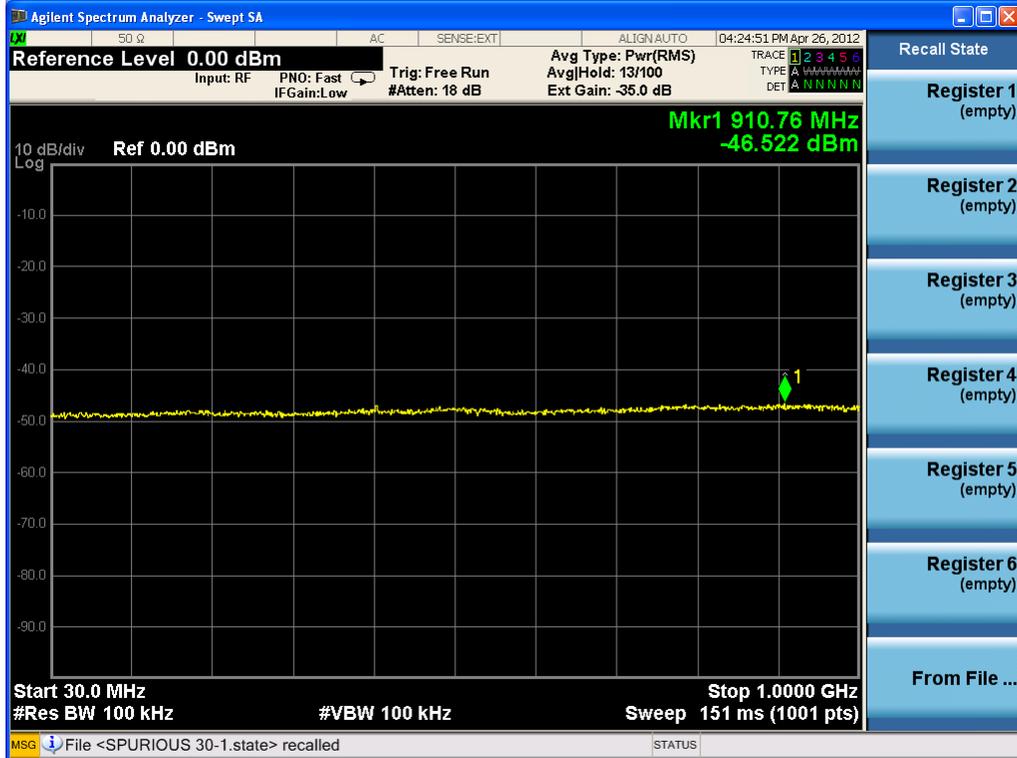
Two carriers (working in middle frequency)

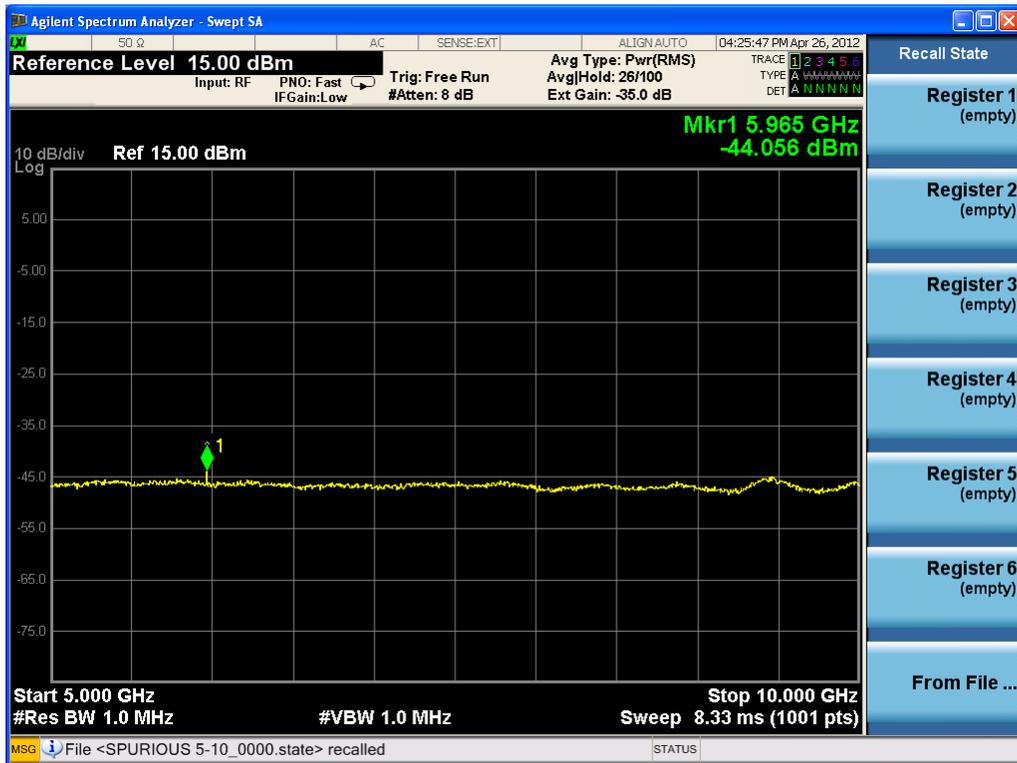
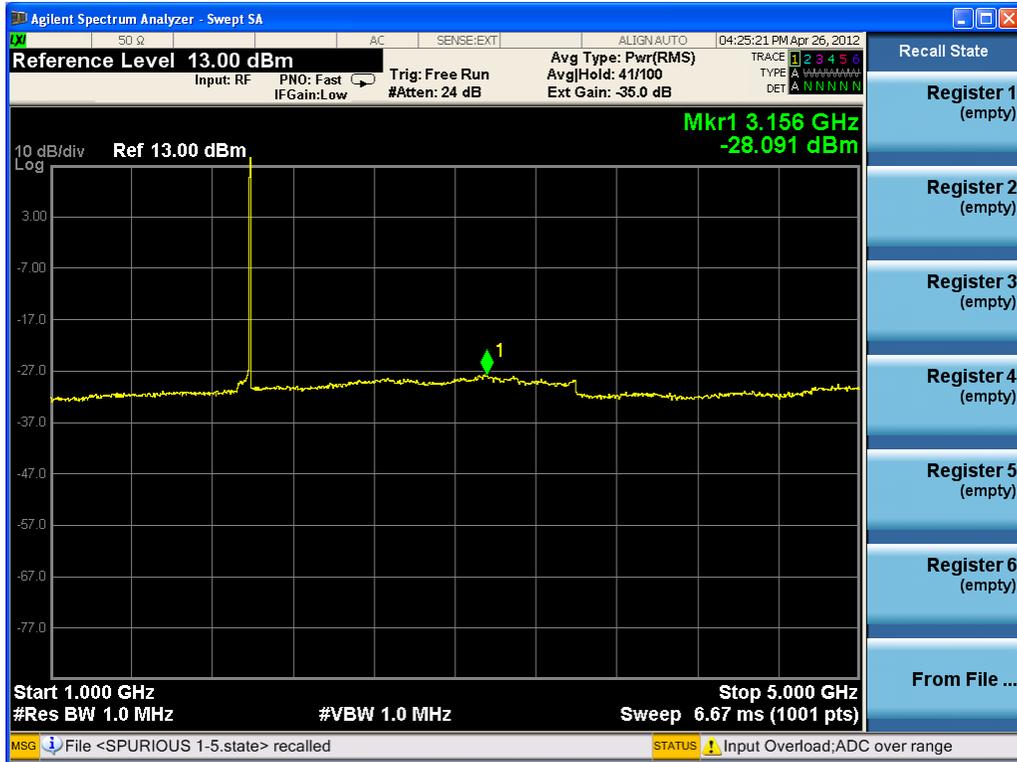


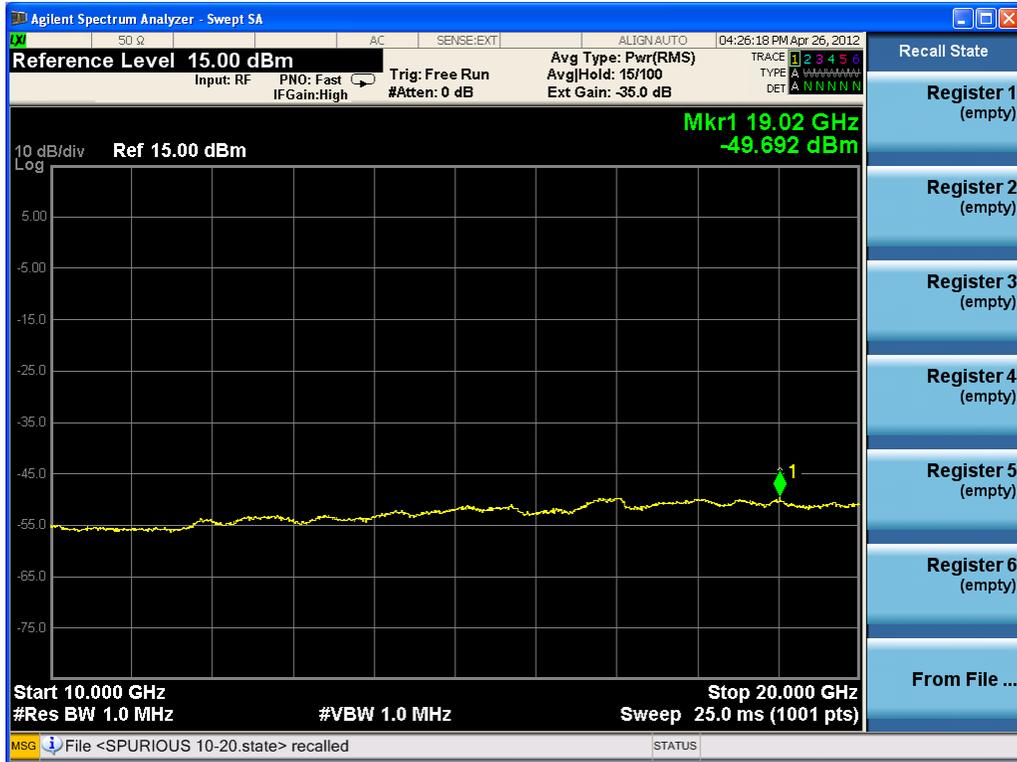




Two carriers (working in top frequency)

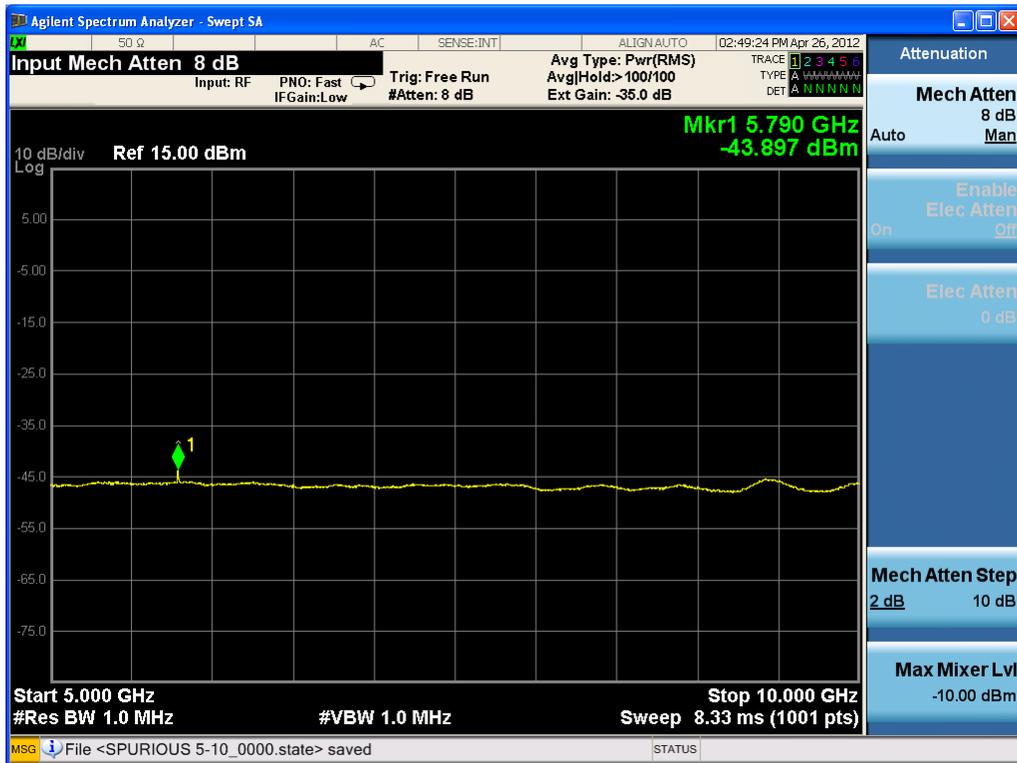
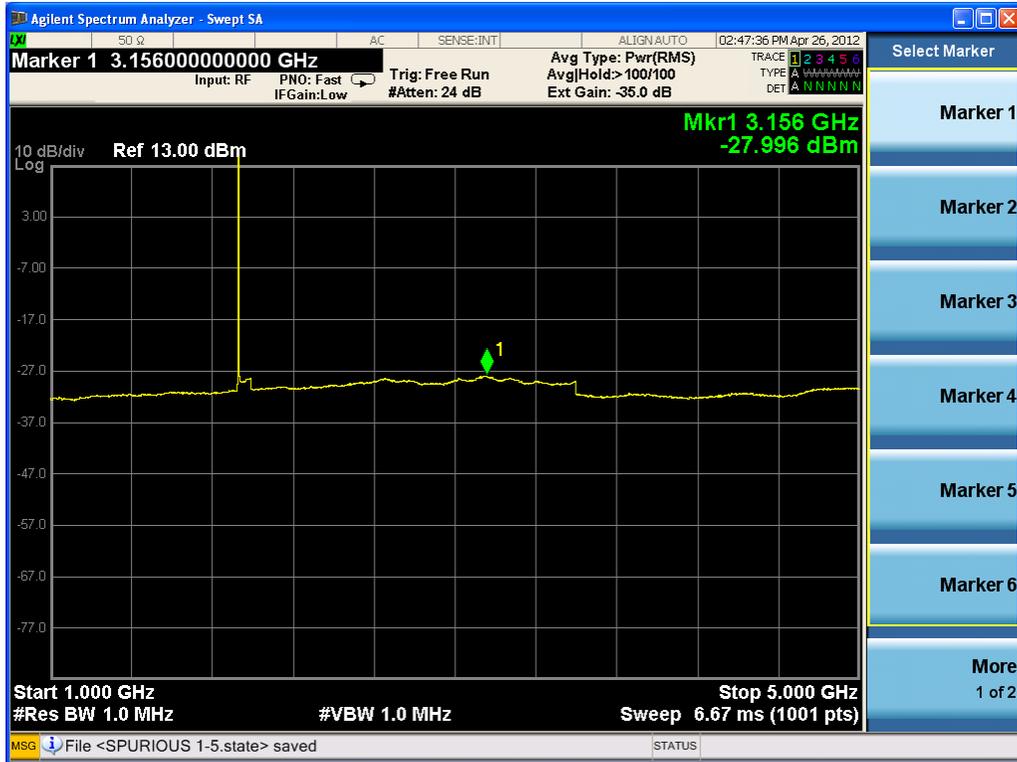


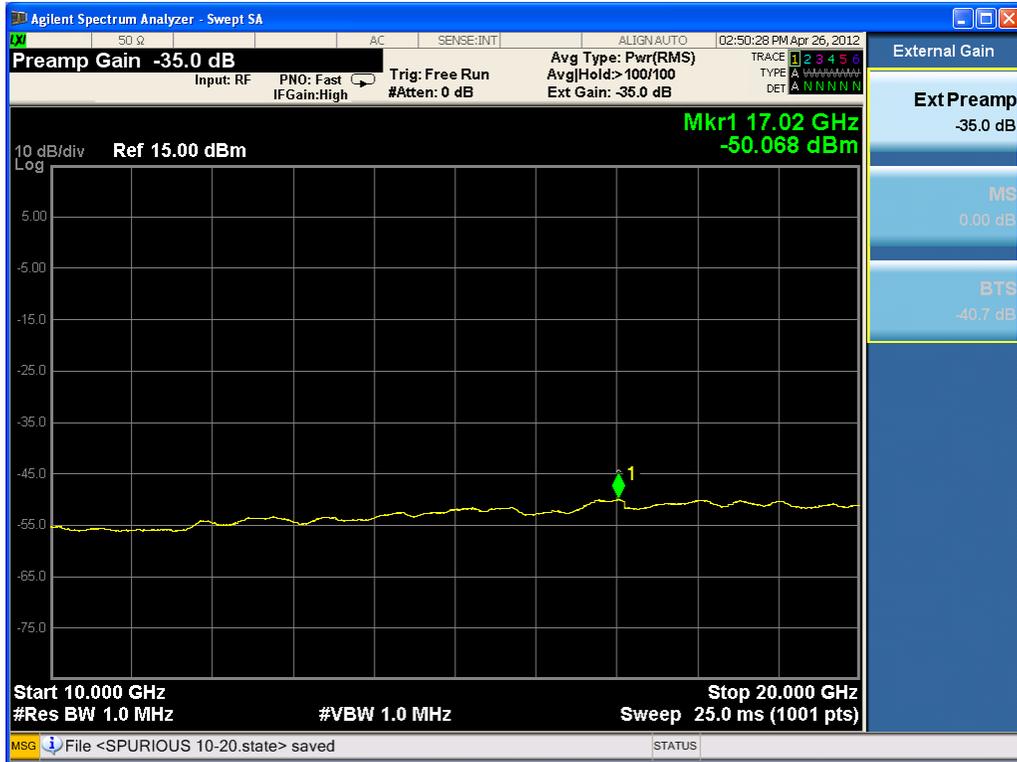




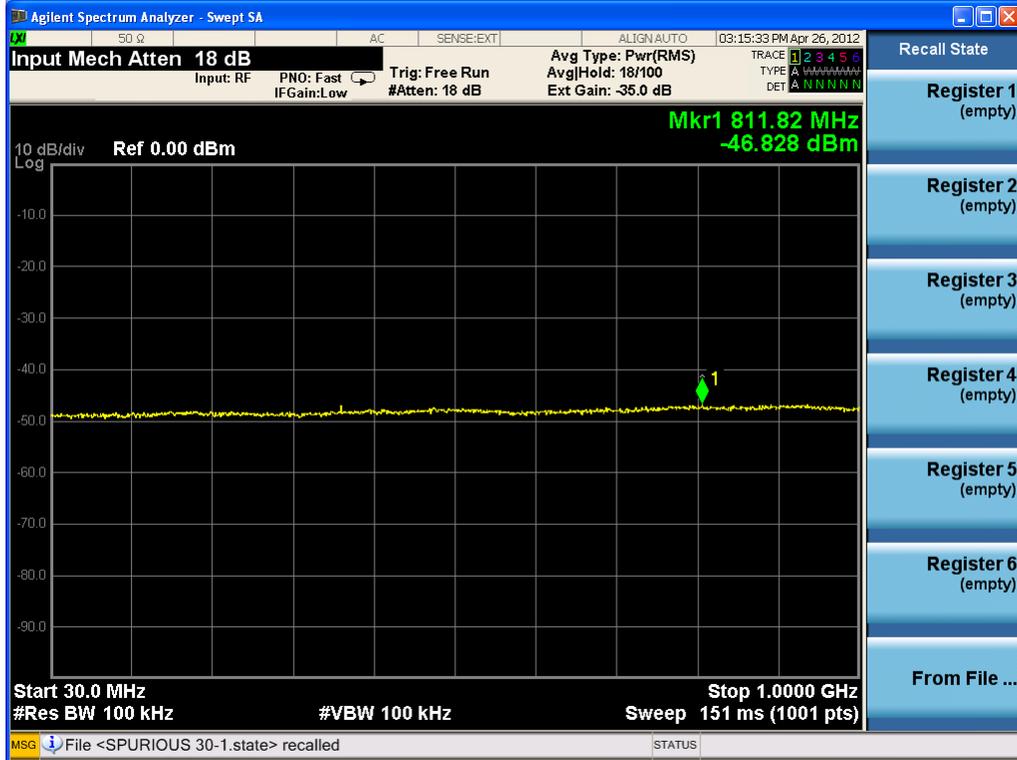
One carrier (working in bottom frequency)

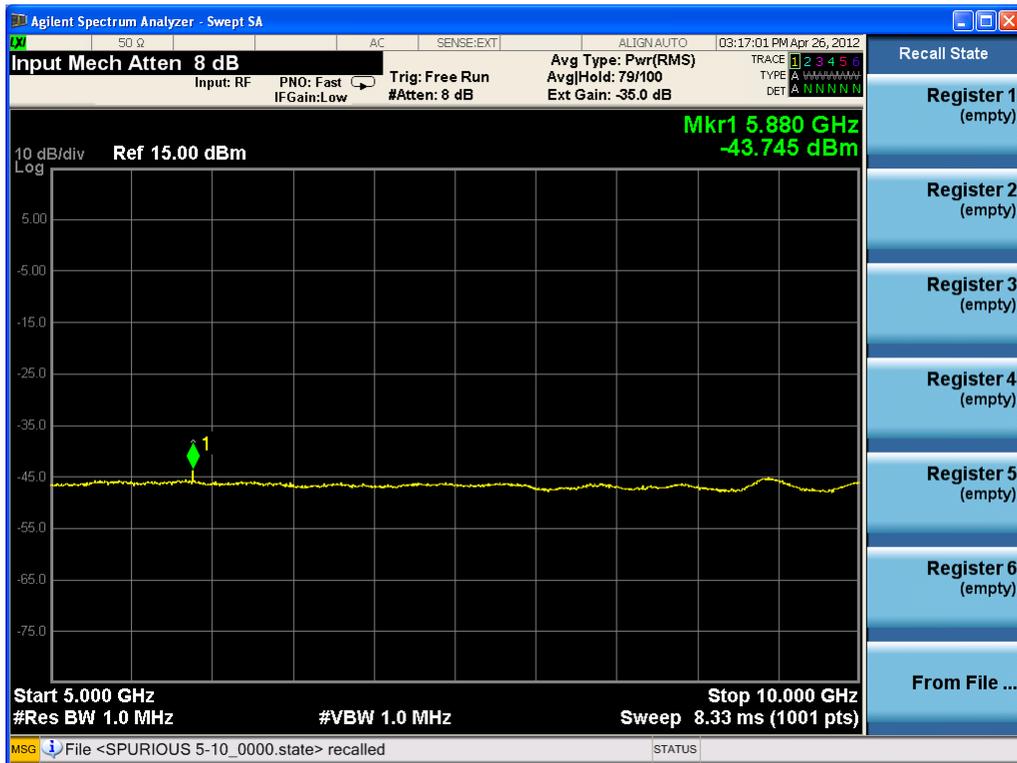
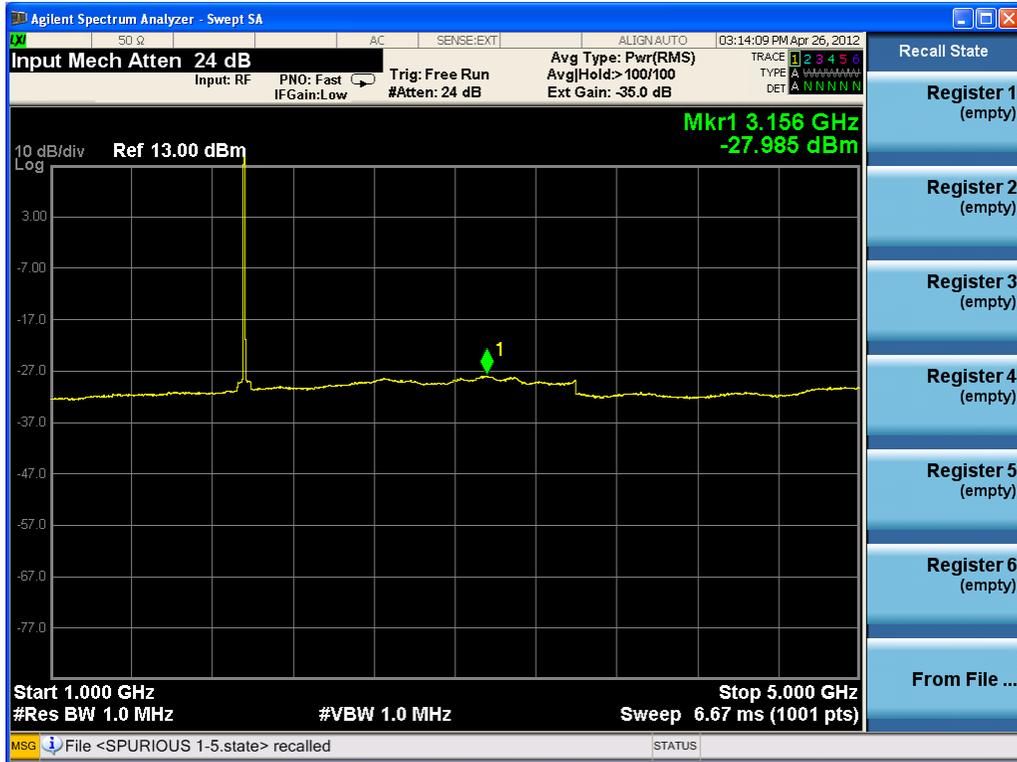


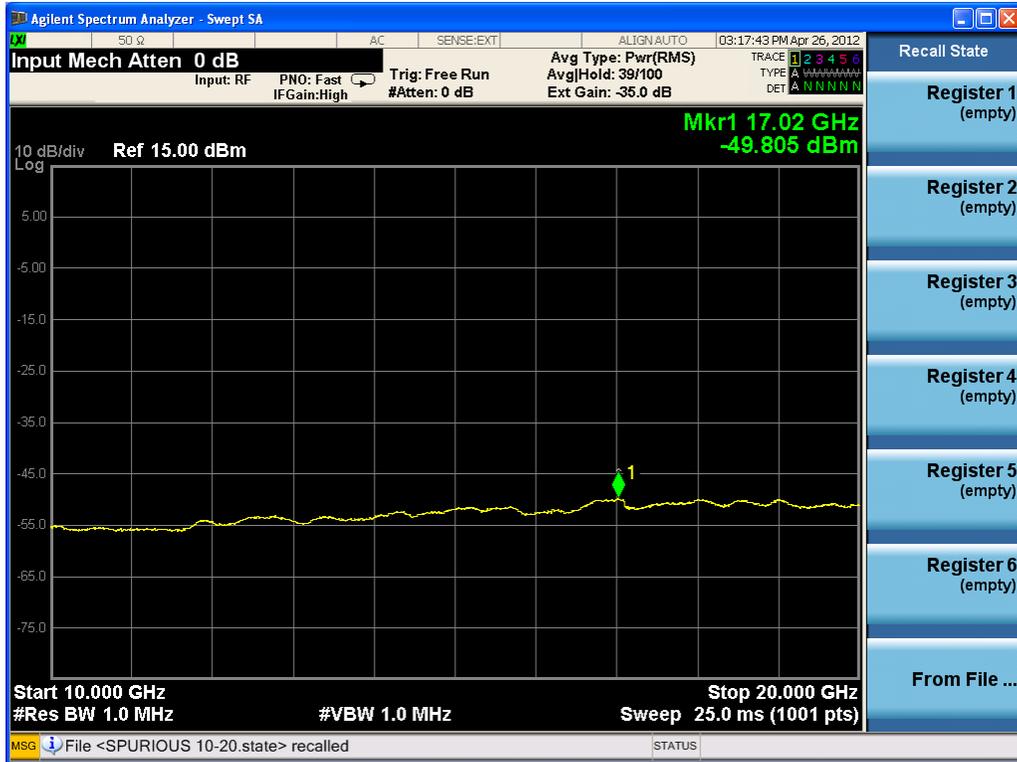




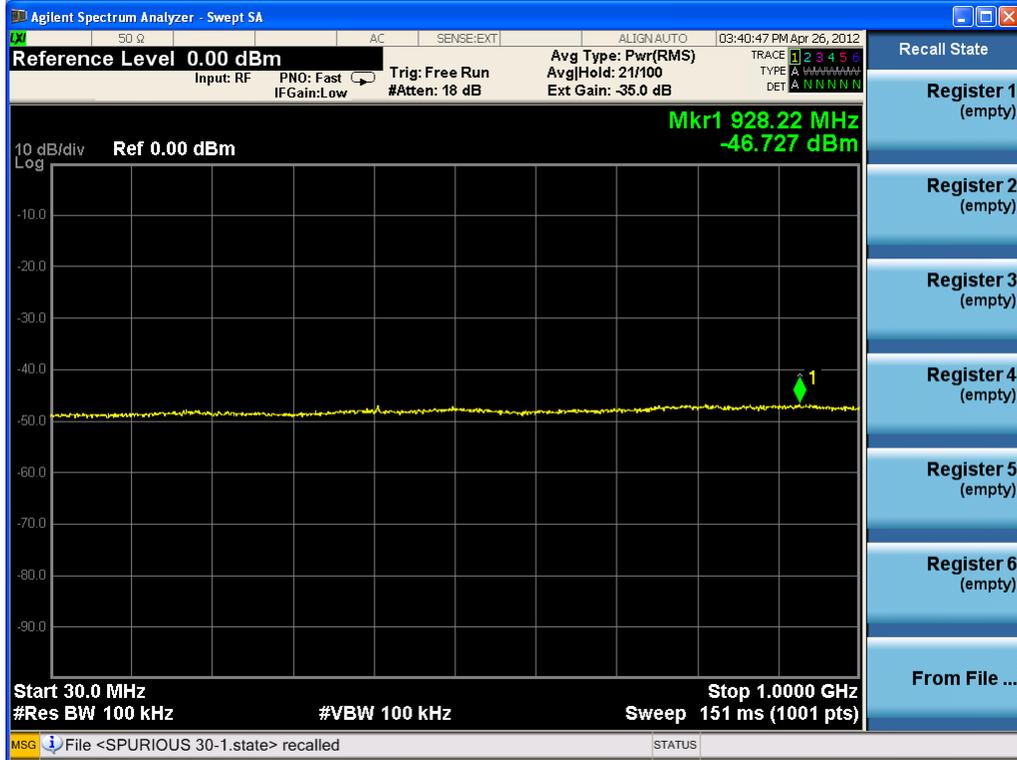
One carrier (working in middle frequency)

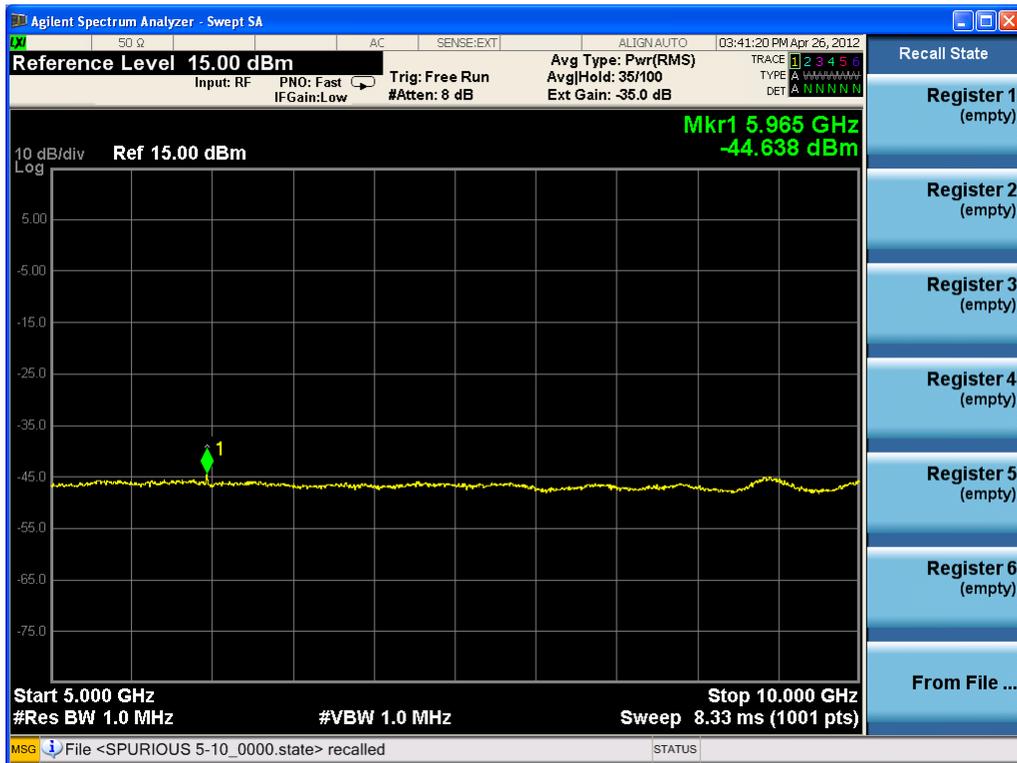
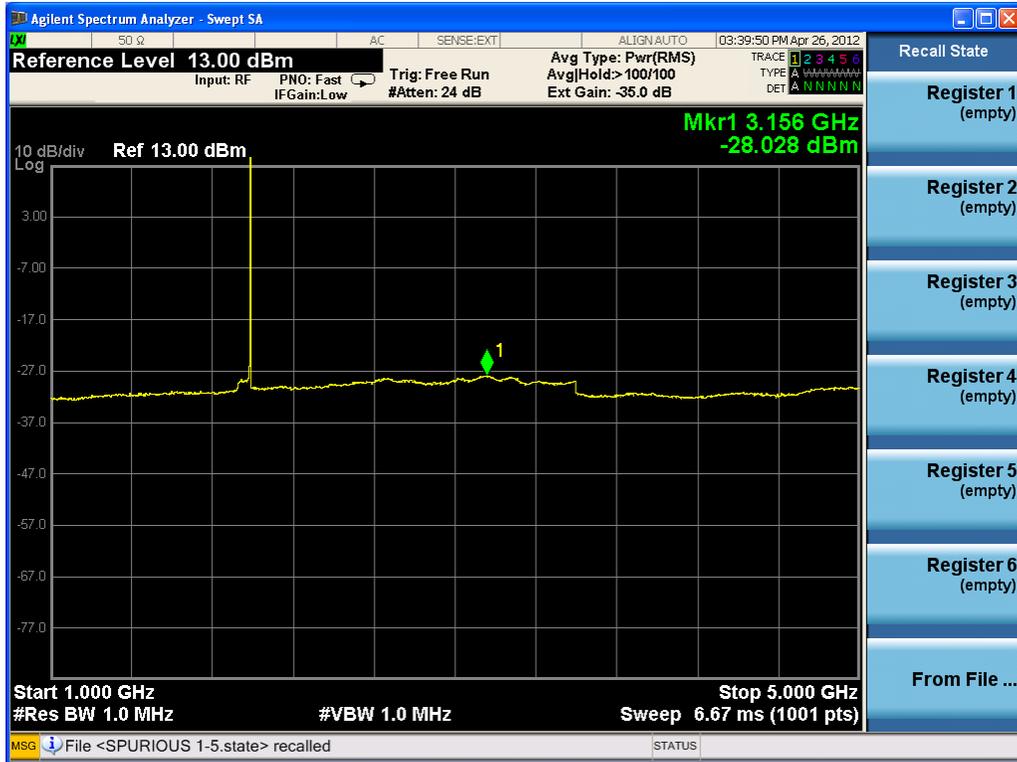


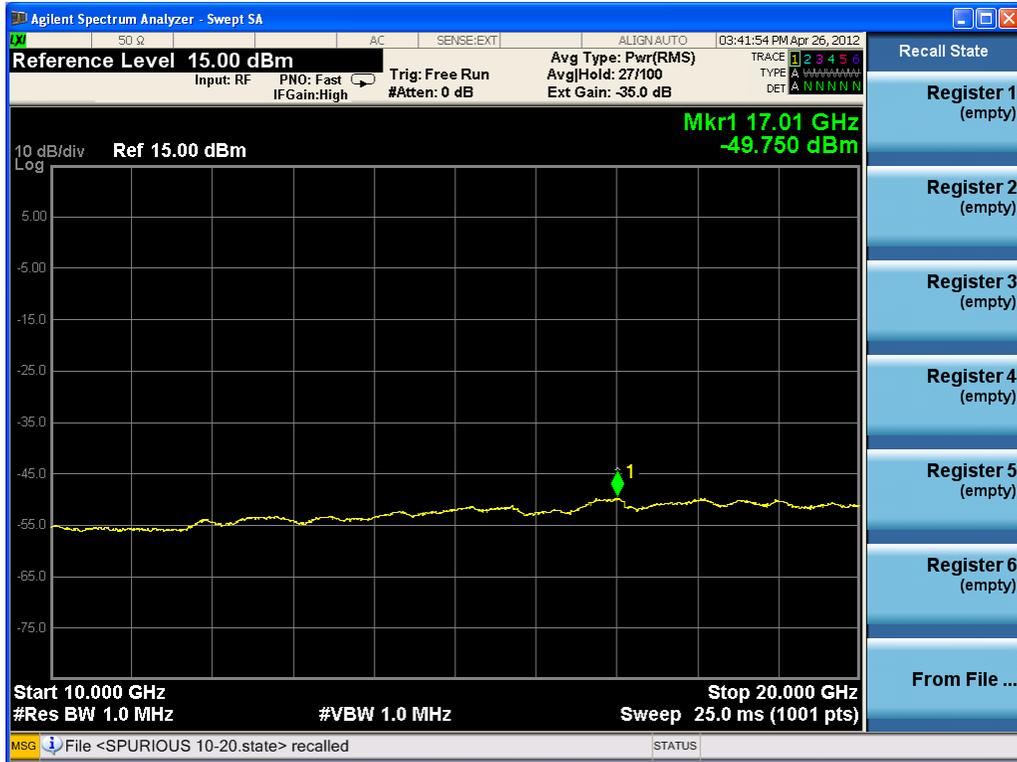




One carrier (working in top frequency)







# 3.6 OCCUPIED BANDWIDTH

**Applicable Standard:** FCC §2.1049 §24.229 §24.238

## Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	005	1054	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

## Test Procedure

The RF out of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. The resolution bandwidth of the spectrum analyzer was set at 1% of the span or higher and 99%Power bandwidth was recorded.

## Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	53%
ATM Pressure:	1009mbar

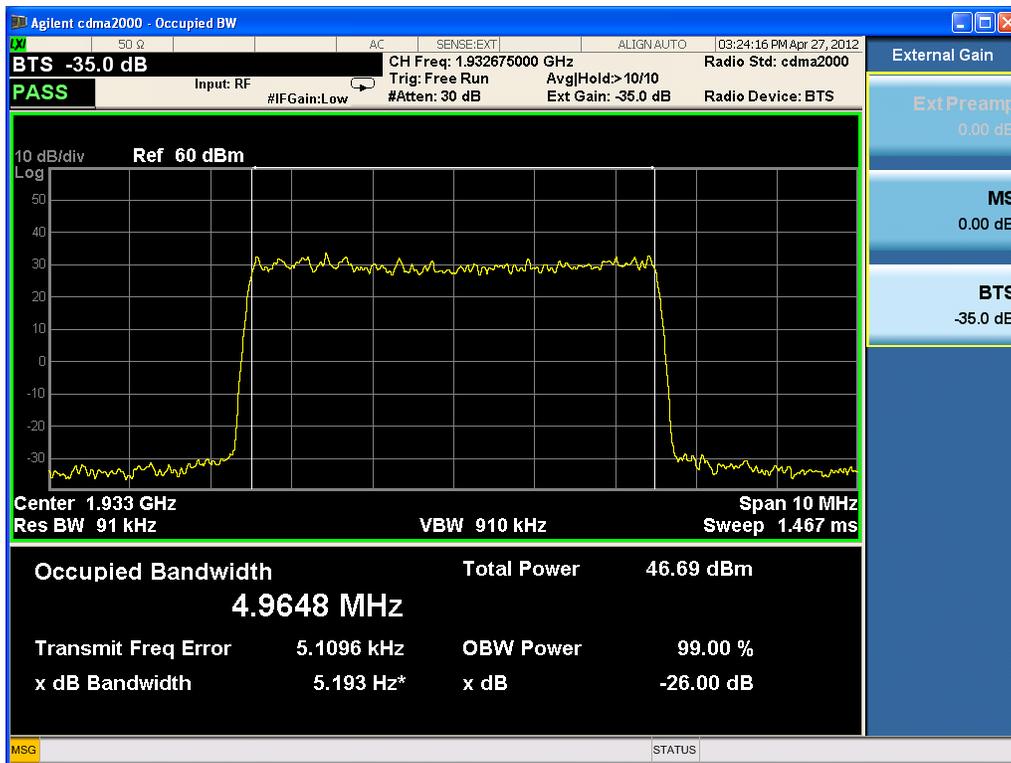
## Test Result: Pass

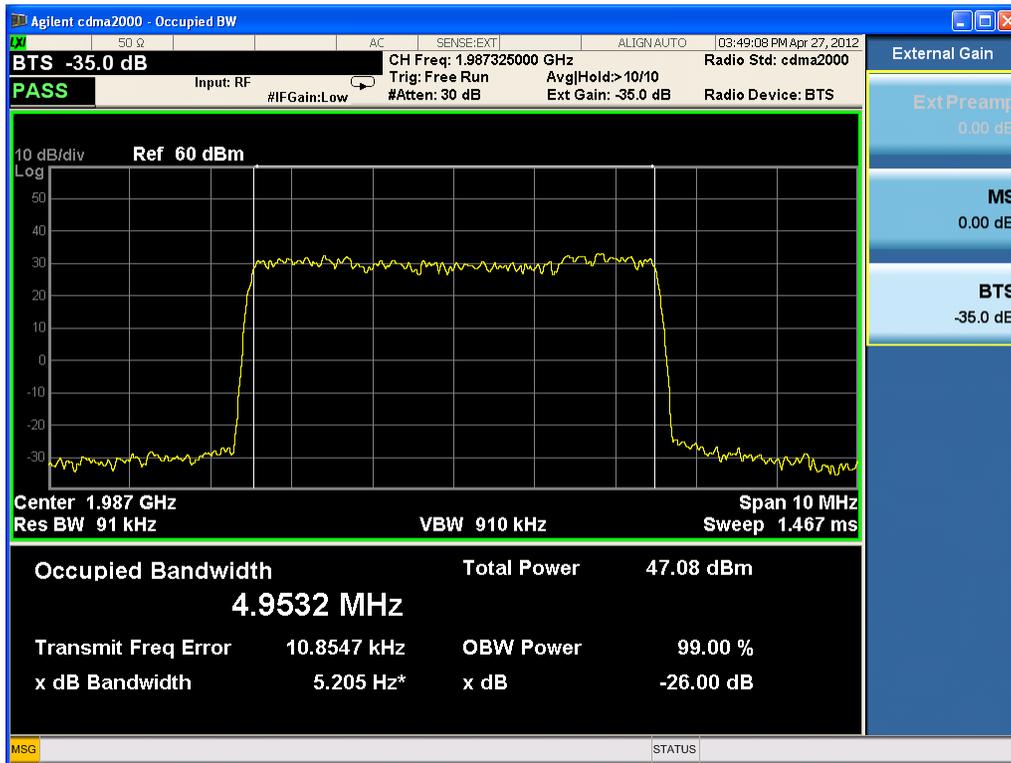
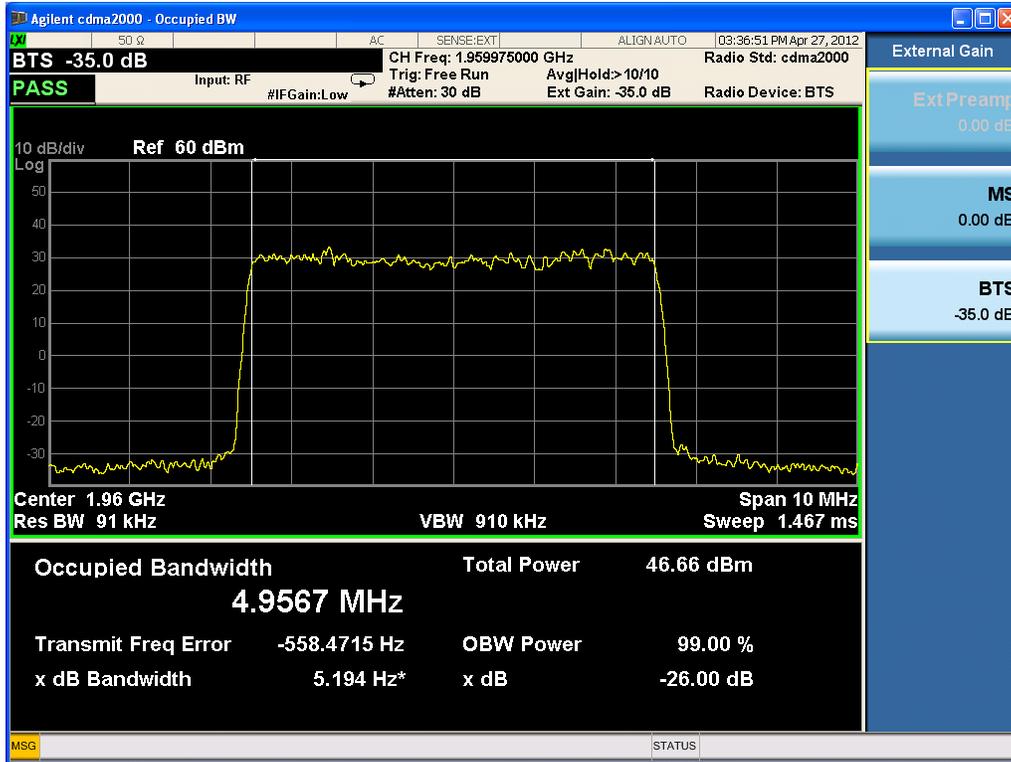
## Test Mode: Transmitting CDMA

## Test Data

For four carries:

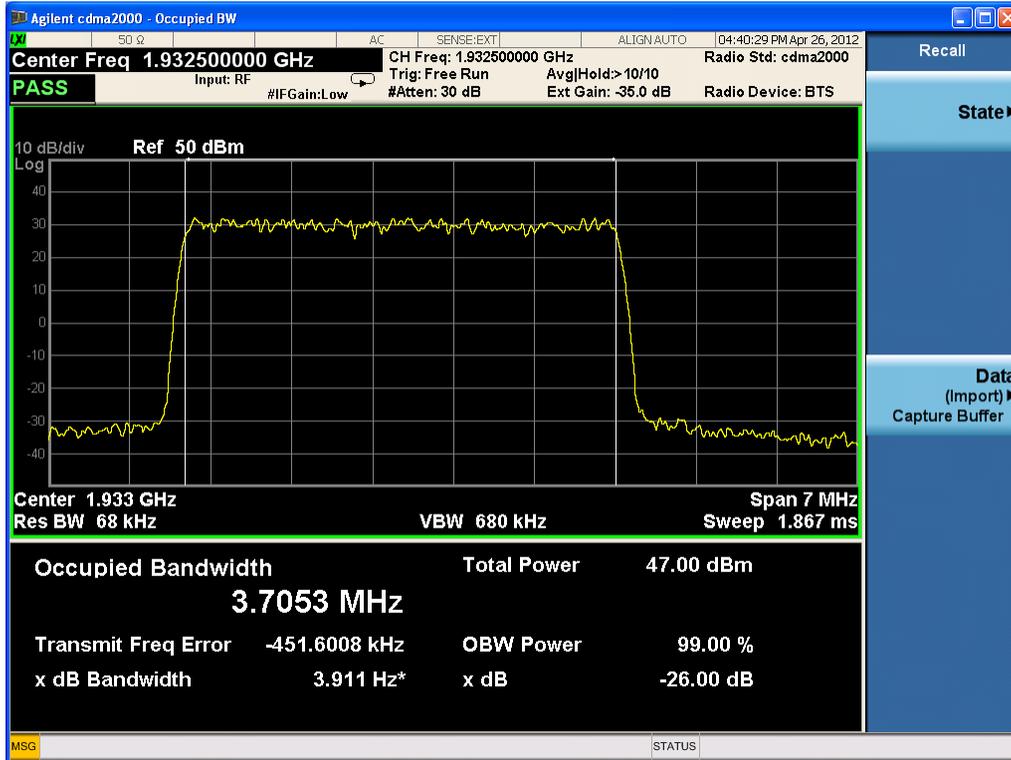
Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
1930.8/1932.05/1933.3/1934.55	4.9648	<5.00
1958.1/1959.35/1960.6/1961.85	4.9567	<5.00
1985.45/1986.7/1987.95/1989.2	4.9532	<5.00

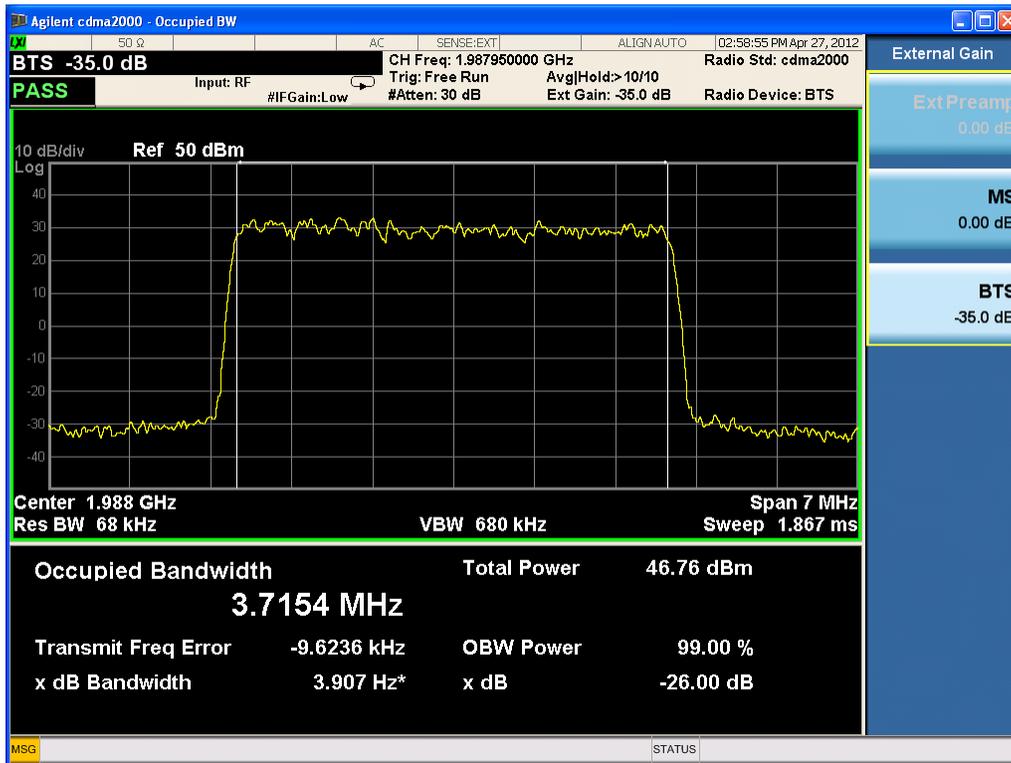
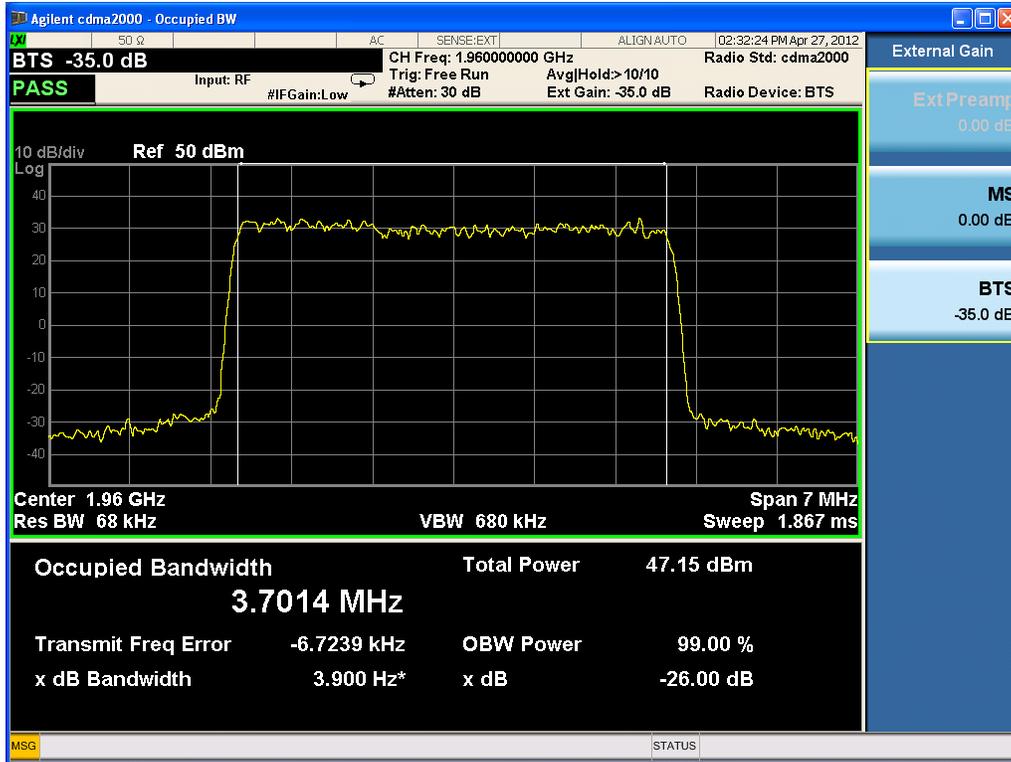




For three carries:

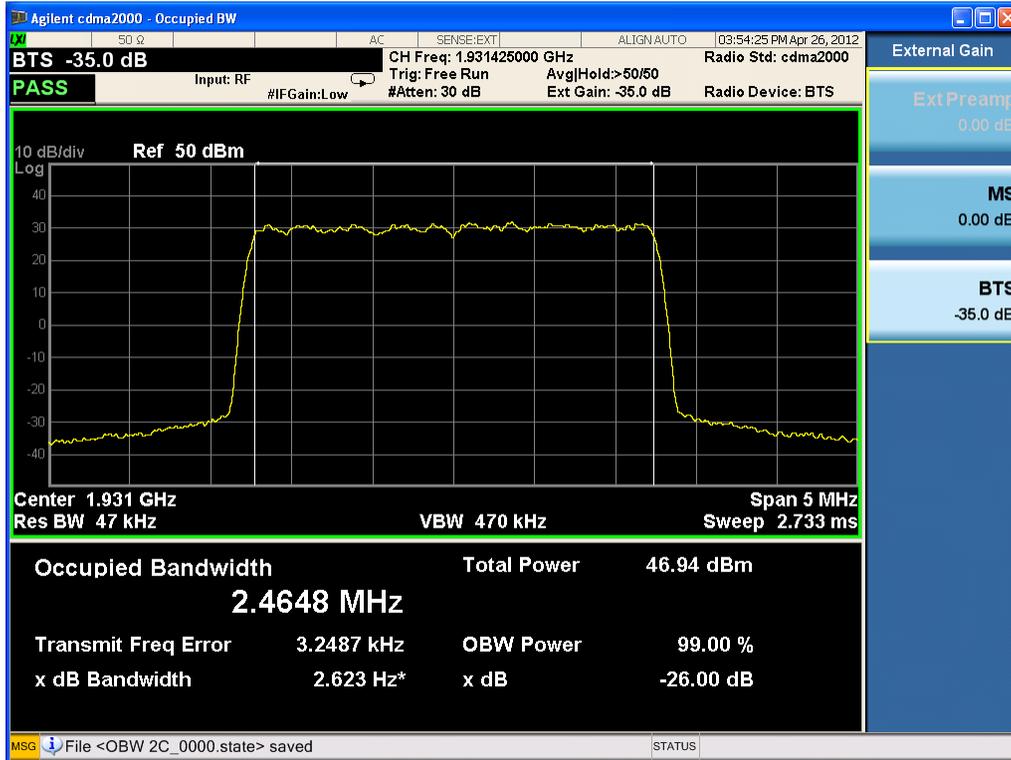
Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
1930.8/1932.05/1933.3	3.7053	<3.75
1958.75/1960/1961.25	3.7014	<3.75
1986.7/1987.95/1989.2	3.7154	<3.75

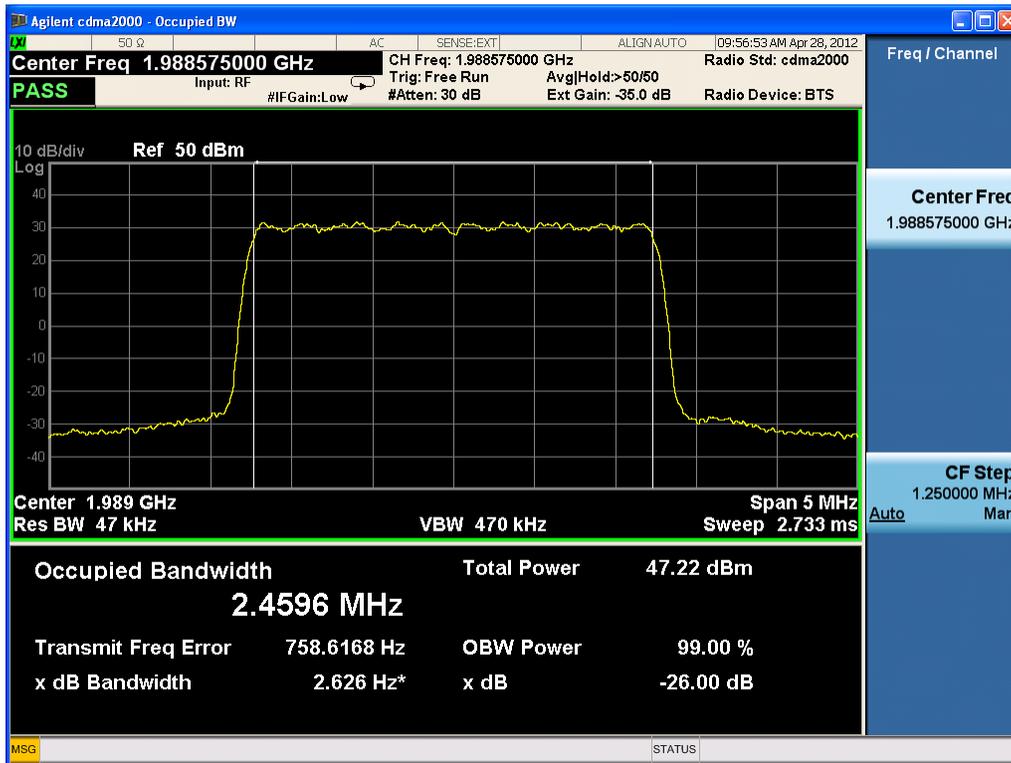
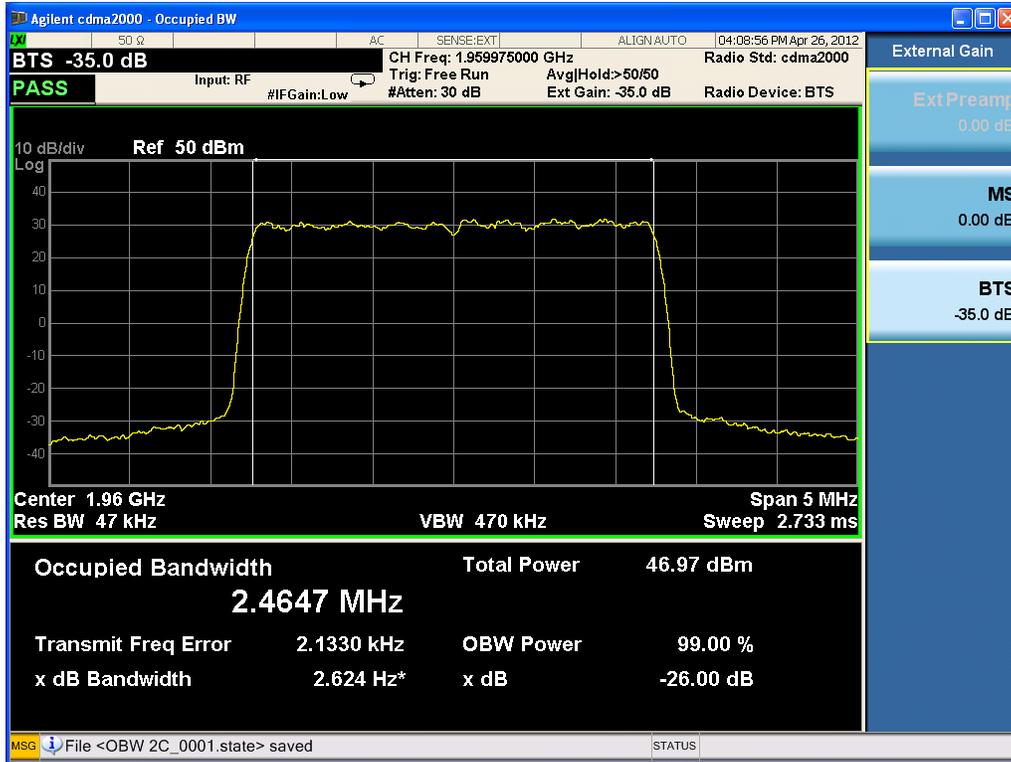




For two carries:

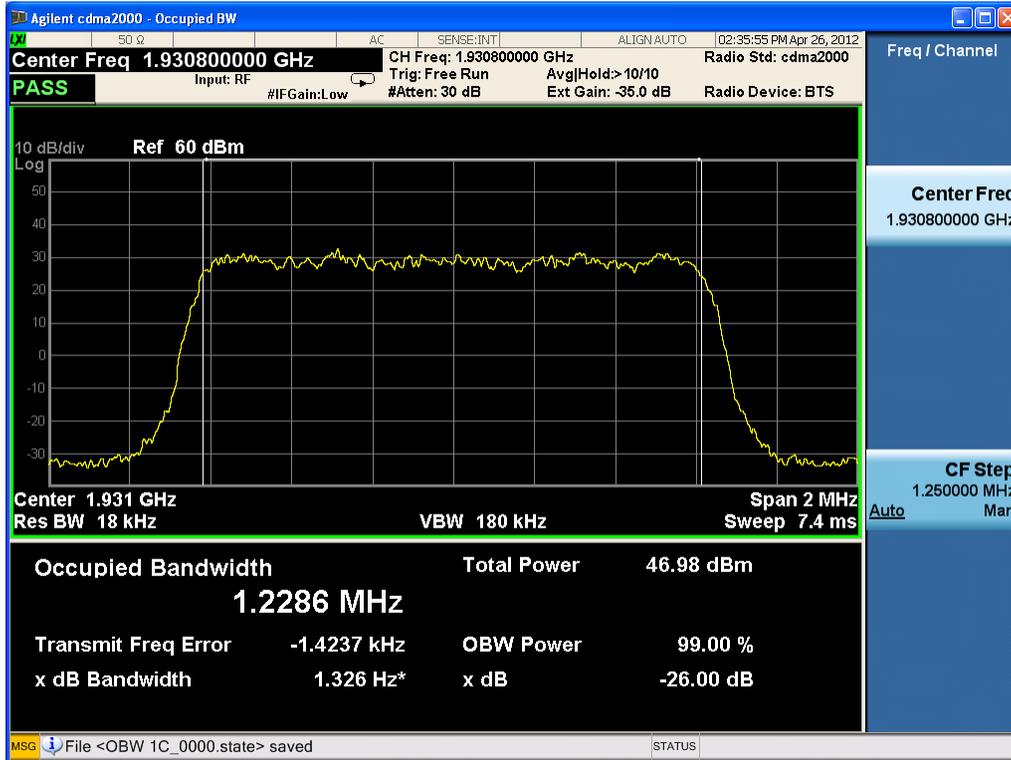
Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
1930.8/1932.05	2.4648	<2.5
1959.35/1960.6	2.4647	<2.5
1987.95/1989.2	2.4596	<2.5

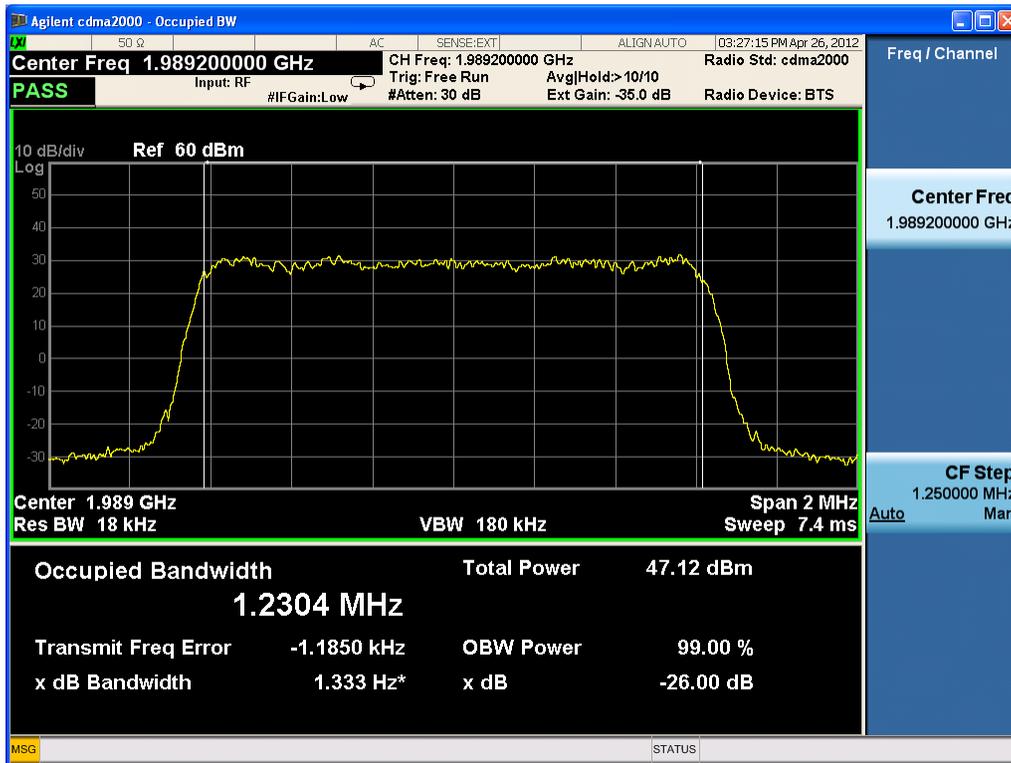
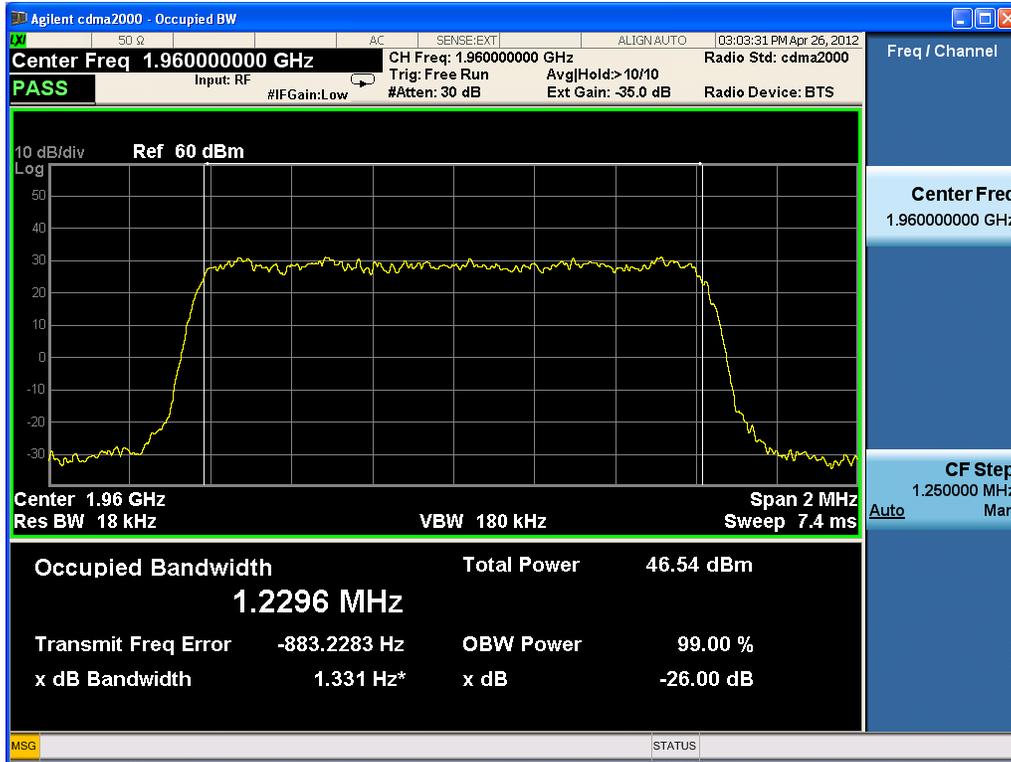




For one carrier:

Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
1930.8	1.2286	<1.25
1960	1.2296	<1.25
1989.2	1.2304	<1.25





### 3.7 BAND EDGES

**Applicable Standard:** FCC §2.1051 §24.238

According to §2.1051 and §24.238, the 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. The limit (dBm) should  $< P - (43 + 10 \log(P)) = -13 \text{dBm}$ .

#### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	005	1054	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

#### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

#### Test Data Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53%
ATM Pressure:	1009mbar

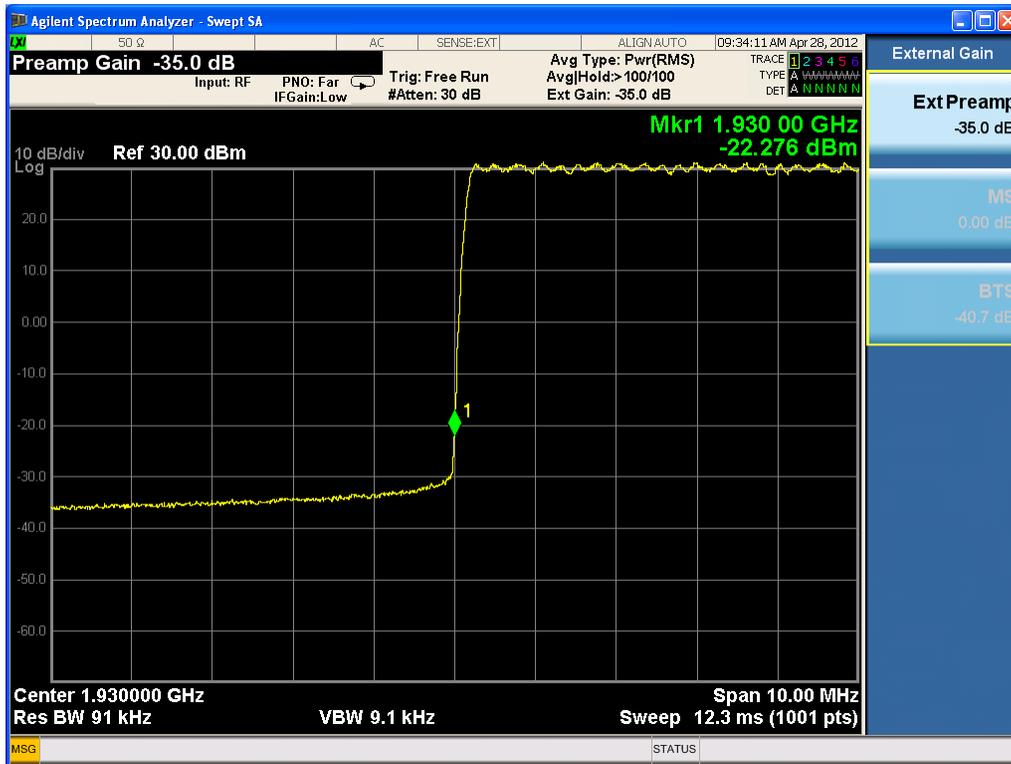
## Test Result: Pass

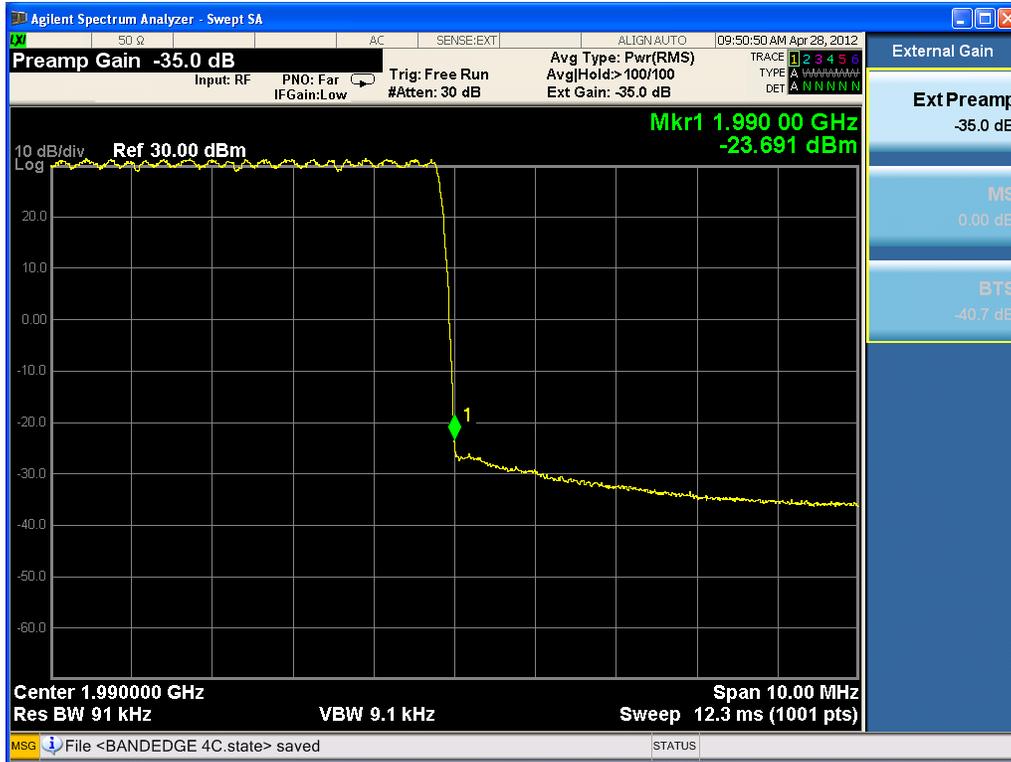
## Test Mode: Transmitting CDMA

## Test Data

Four carriers

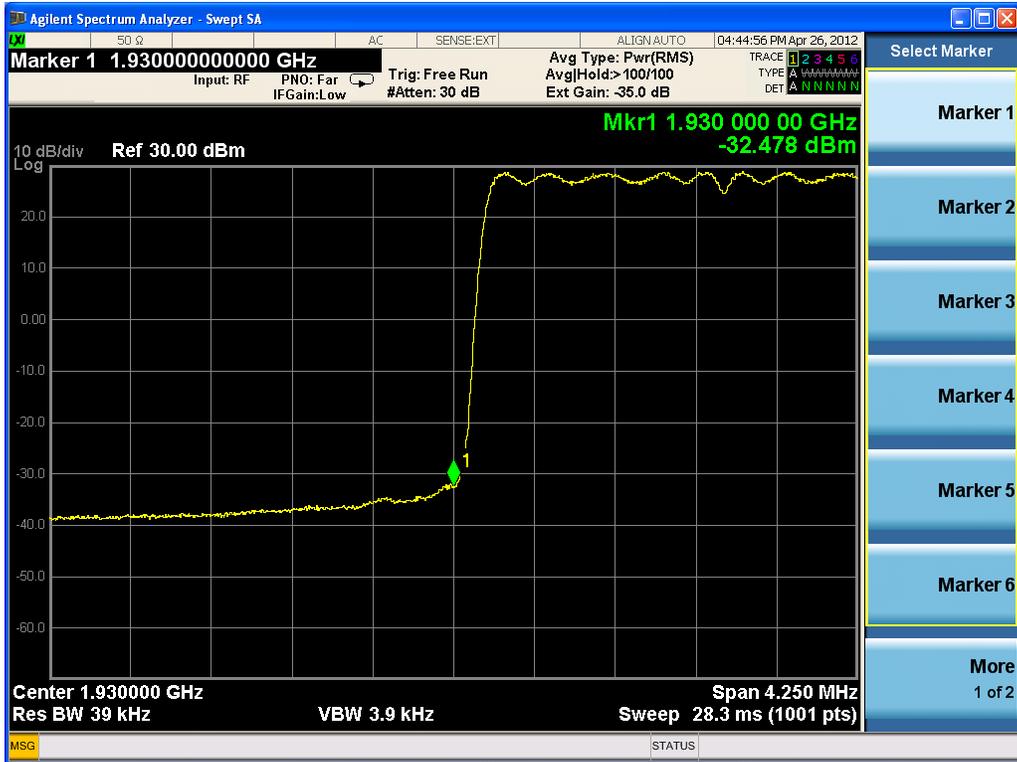
Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1930.8/1932.05/1933.3/1934.55	-22.276	-13.00
1985.45/1986.7/1987.95/1989.2	-23.691	-13.00





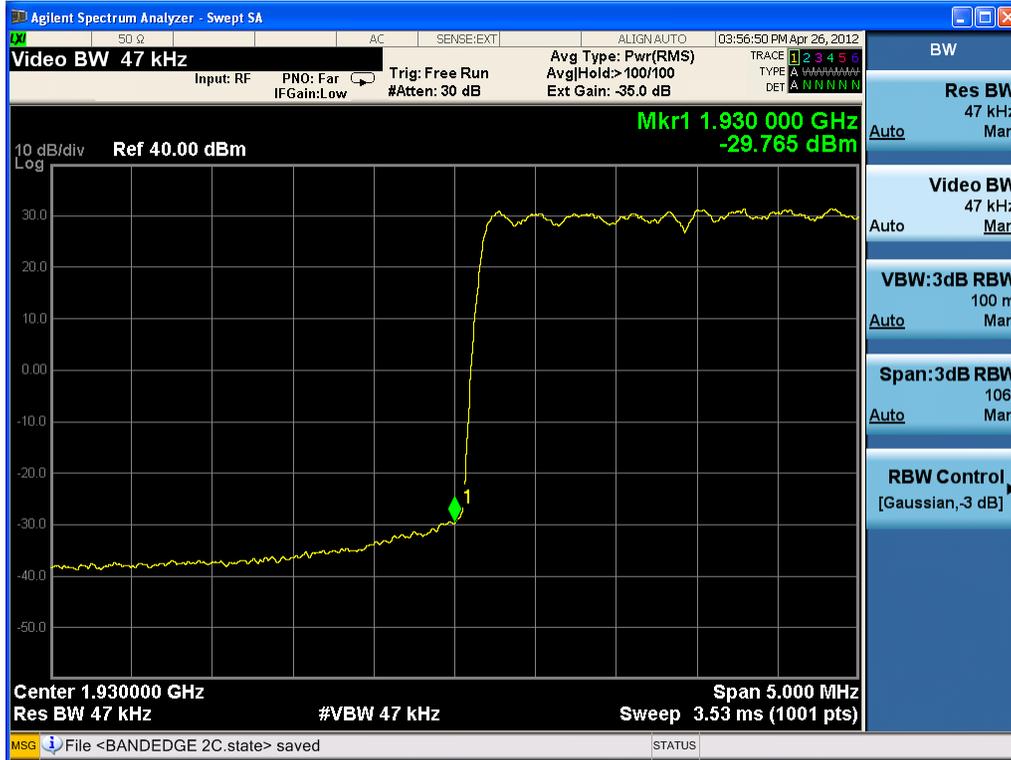
Three carriers

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1930.8/1932.05/1933.3	-32.478	-13.00
1986.7/1987.95/1989.2	-26.941	-13.00



Two carriers

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1930.8/1932.05	-29.765	-13.00
1987.95/1989.2	-27.203	-13.00





One carrier

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
1930.8	-29.787	-13.00
1989.2	-26.201	-13.00



# 3.8 FREQUENCY STABILITY

## Applicable Standard: FCC § 2.1055 § 24.235

Requirements: FCC § 2.1055 (a)(d) .The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
GZ-ESPEC	Temperature Chamber	EW0470	06113028	2012-1-26	2013-1-26
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	40dB Attenuator	ATSI150-4-40	11300100204204	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	002	1034	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

## Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 150 minutes, the frequency output was recorded from the counter.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

## Environmental Conditions

Normal condition:	25° C
-------------------	-------

Relative Humidity:	54%
ATM Pressure:	1011 mbar

**Test Result:** Pass

**Test Mode:** Transmitting CDMA

**Test Data**

**Frequency Stability Versus Temperature**

Frequency Stability vs. Temperature					
Temperature °C	Power Supplied VDC	Frequency Measure Error Hz	Error ppm	Limit ppm	Result
<b>B(1930.8MHz)</b>					
-40	-48	1.4	0.001	0.02	PASS
-30	-48	1.2	0.001	0.02	PASS
-20	-48	1.1	0.001	0.02	PASS
-10	-48	1.4	0.001	0.02	PASS
0	-48	1.5	0.001	0.02	PASS
10	-48	1.2	0.001	0.02	PASS
20	-48	1.2	0.001	0.02	PASS
30	-48	1.1	0.001	0.02	PASS
40	-48	1.6	0.001	0.02	PASS
50	-48	1.1	0.001	0.02	PASS
55	-48	1.2	0.001	0.02	PASS
<b>M(1960MHz)</b>					
-40	-48	1	0.001	0.02	PASS
-30	-48	1.1	0.001	0.02	PASS
-20	-48	1.3	0.001	0.02	PASS
-10	-48	1.4	0.001	0.02	PASS
0	-48	1.1	0.001	0.02	PASS
10	-48	1.1	0.001	0.02	PASS

20	-48	1.7	0.001	0.02	PASS
30	-48	1.2	0.001	0.02	PASS
40	-48	1.1	0.001	0.02	PASS
50	-48	1.2	0.001	0.02	PASS
55	-48	1.4	0.001	0.02	PASS
<b>T (1989.2MHz)</b>					
-40	-48	1.2	0.001	0.02	PASS
-30	-48	1.1	0.001	0.02	PASS
-20	-48	1.2	0.001	0.02	PASS
-10	-48	1.4	0.001	0.02	PASS
0	-48	1.1	0.001	0.02	PASS
10	-48	1.2	0.001	0.02	PASS
20	-48	1.4	0.001	0.02	PASS
30	-48	1.2	0.001	0.02	PASS
40	-48	1.2	0.001	0.02	PASS
50	-48	1.1	0.001	0.02	PASS
55	-48	1.1	0.001	0.02	PASS

## Frequency Stability Versus Voltage

Frequency Stability vs. Voltage					
Voltage Vac	Temperature	Frequency Measure Error Hz	Error ppm	Limit ppm	Result
<b>B(1930.8MHz)</b>					
40	20	1.2	0.001	0.02	PASS
44	20	1.3	0.001	0.02	PASS
47	20	1.2	0.001	0.02	PASS
50	20	1.1	0.001	0.02	PASS
53	20	1.2	0.001	0.02	PASS
56	20	1.4	0.001	0.02	PASS
57	20	1.2	0.001	0.02	PASS
<b>M(1960MHz)</b>					
40	20	1.2	0.001	0.02	PASS
44	20	1.5	0.001	0.02	PASS
47	20	1.1	0.001	0.02	PASS
50	20	1.3	0.001	0.02	PASS
53	20	1.1	0.001	0.02	PASS
56	20	1.2	0.001	0.02	PASS
57	20	1.2	0.001	0.02	PASS
<b>T(1989.2MHz)</b>					
40	20	1.2	0.001	0.02	PASS
44	20	1.1	0.001	0.02	PASS
47	20	1.2	0.001	0.02	PASS
50	20	1.1	0.001	0.02	PASS
53	20	1.3	0.001	0.02	PASS
56	20	1.4	0.001	0.02	PASS
57	20	1.2	0.001	0.02	PASS

## 4 UMTS OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1046 §24.232	Transmitter output Power	Compliant
§2.1091 §1.1037	RF Exposure	Compliant
§2.1047	Modulation Characteristic	Compliant
§2.1053	Spurious Radiated Emissions	Compliant
§2.1051, §24.238	Spurious Emissions AT Antenna Terminals	Compliant
§2.1049 §24.229 §24.238	Occupied Bandwidth	Compliant
§2.1051, §24.238	Band Edge	Compliant
§ 2.1055 § 24.235	Frequency stability	Compliant

# 4.1 TRANSMITTER OUTPUT POWER

## Applicable Standard: FCC §2.1046 §24.232

According to FCC §2.1046 & 24.232, the EIRP (equivalent isotropically radiated power) must not exceed 1640 Watts.

According to RSS-133, SRSP 510 5.1.1 the EIRP (equivalent isotropically radiated power) must not exceed 3280Watts/MHz for base station transmitters operating in the band of 1930 MHz to 1995MHz with the antenna height above average terrain up to 300 meters. If used in urban area, the limit should be 1640Watts/MHz.

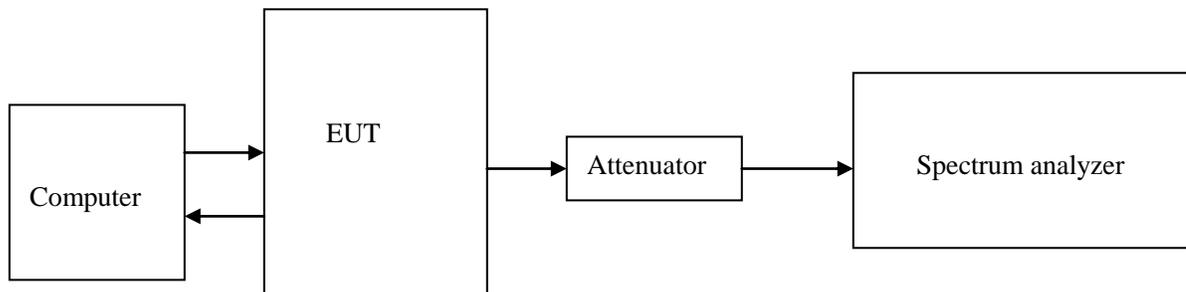
Note: EIRP= Max output Power+ Antenna gain- Cable Loss

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	40dB Attenuator	ATSI150-4-40	11300100204204	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	002	1034	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

## Test Procedure



The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. External attenuation Loss is 40dB, Cable Loss is about 2dB.

## Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

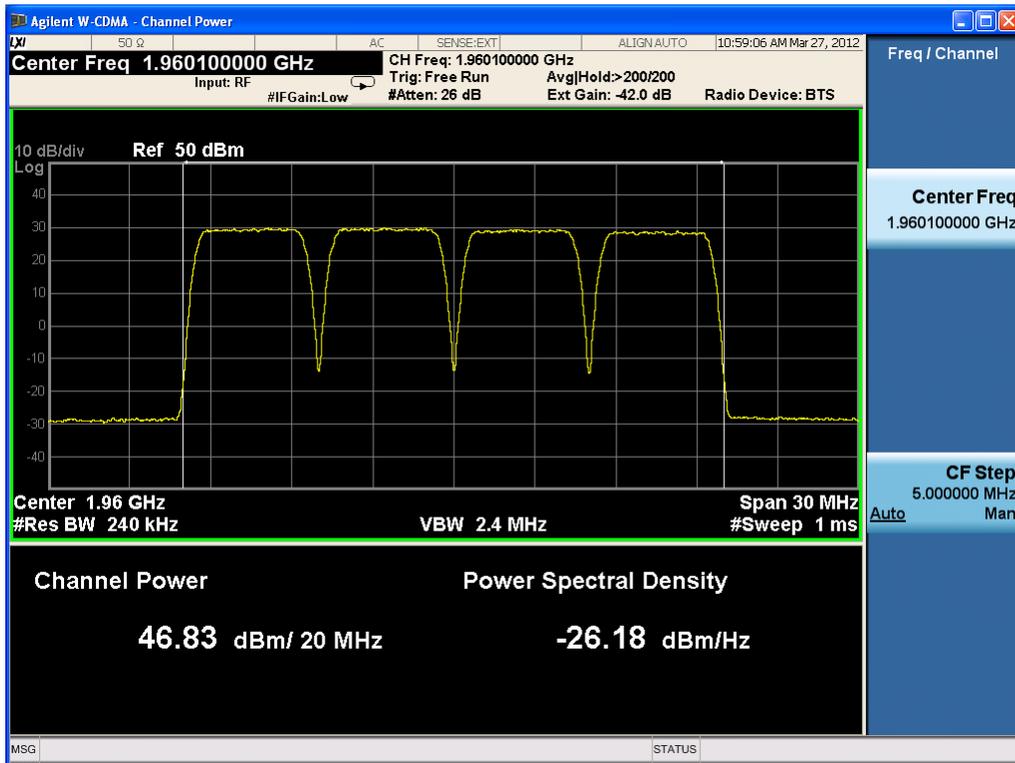
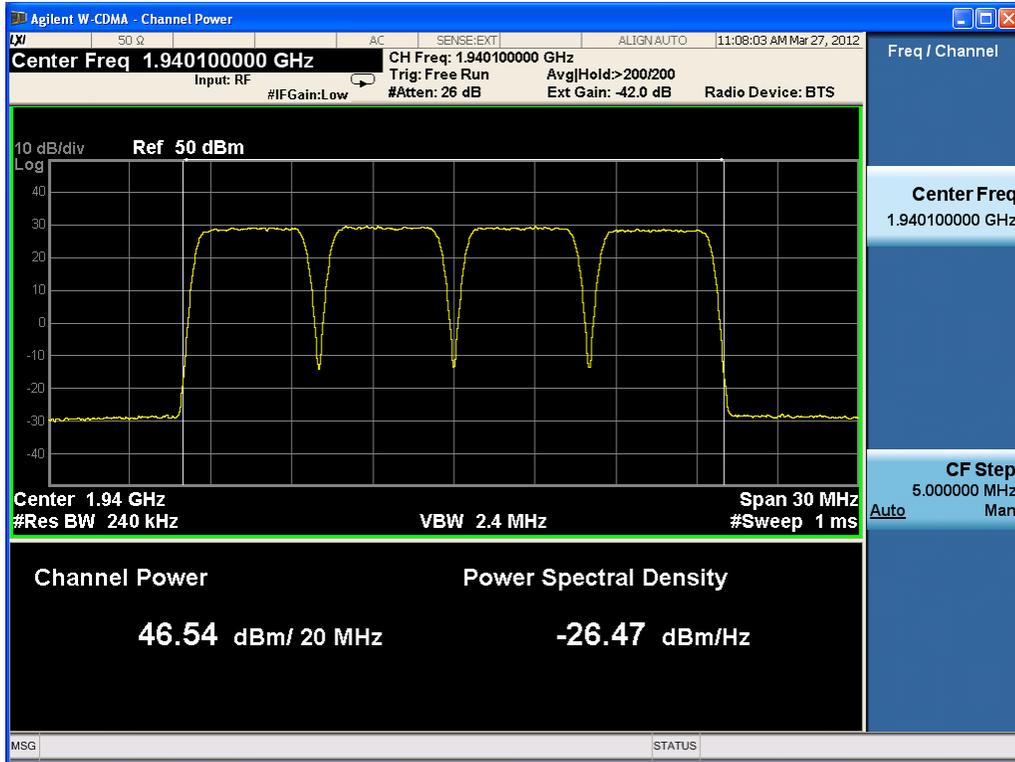
**Test Result:** Pass

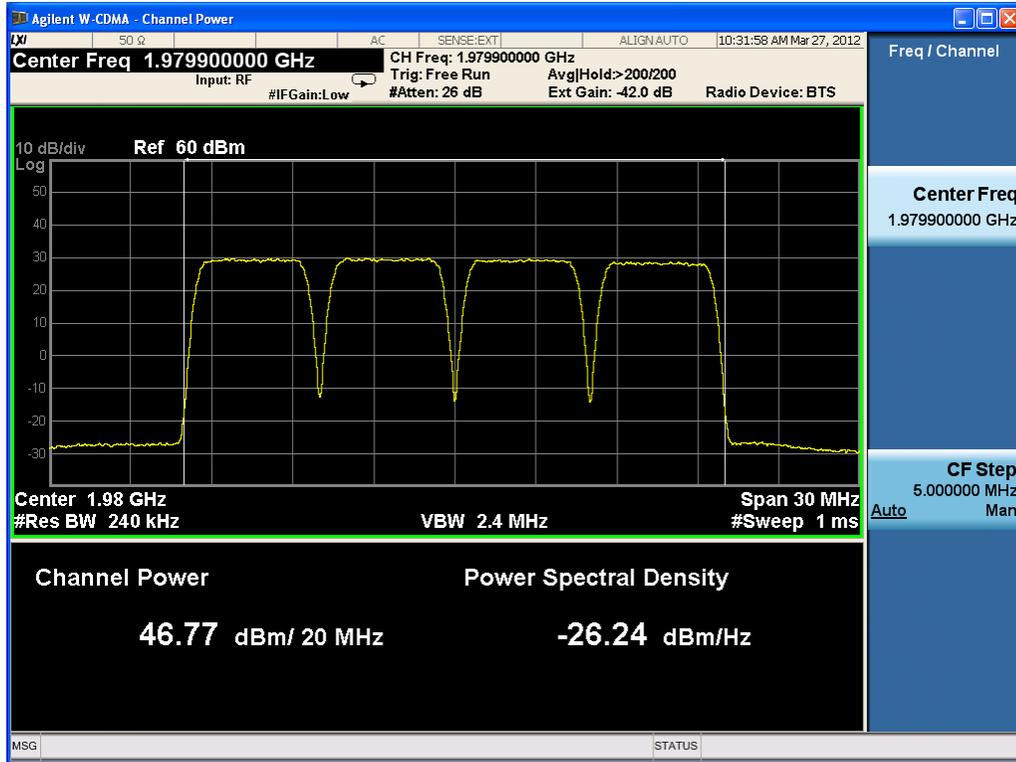
**Test Mode:** Transmitting UMTS

## Test Data:

### Four carriers

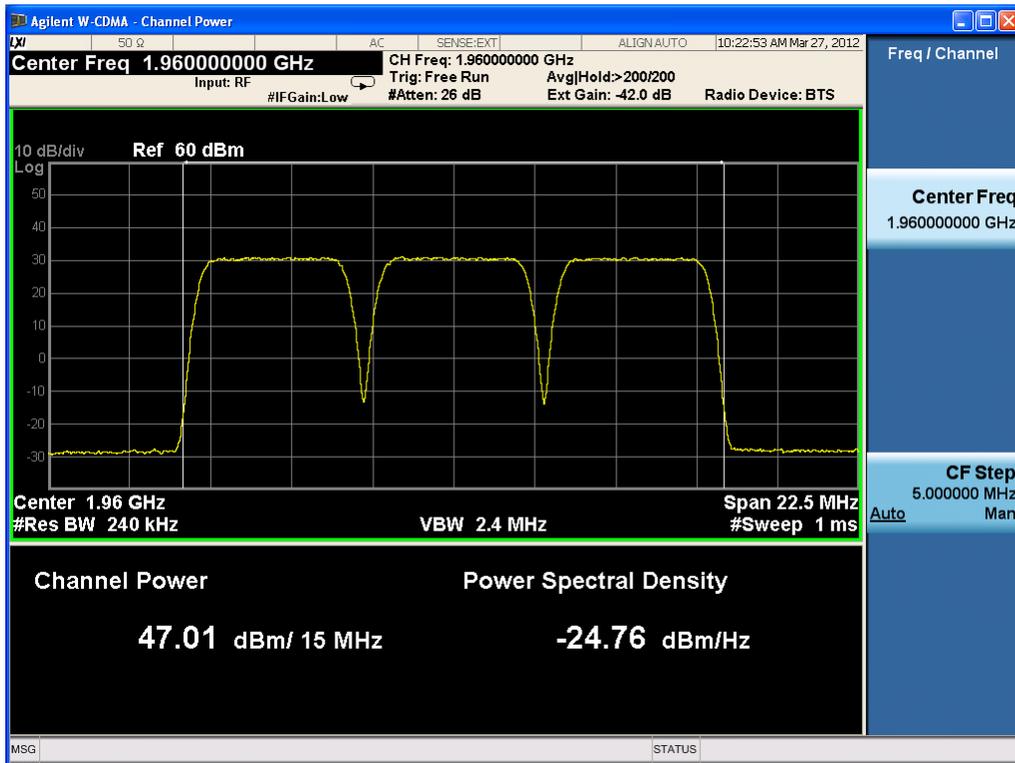
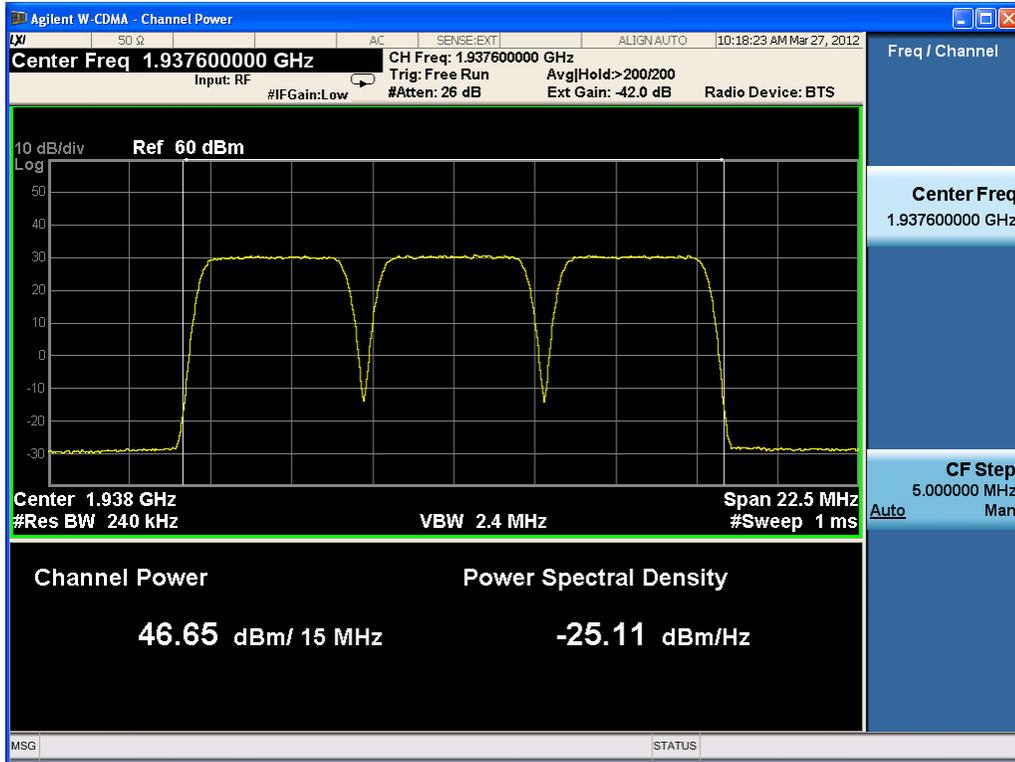
Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1940.1	1932.6/1937.6/1942.6/1947.6	46.54
1960.1	1952.6/1957.6/1962.6/1967.6	46.83
1979.9	1972.4/1977.4/1982.4/1987.4	46.77

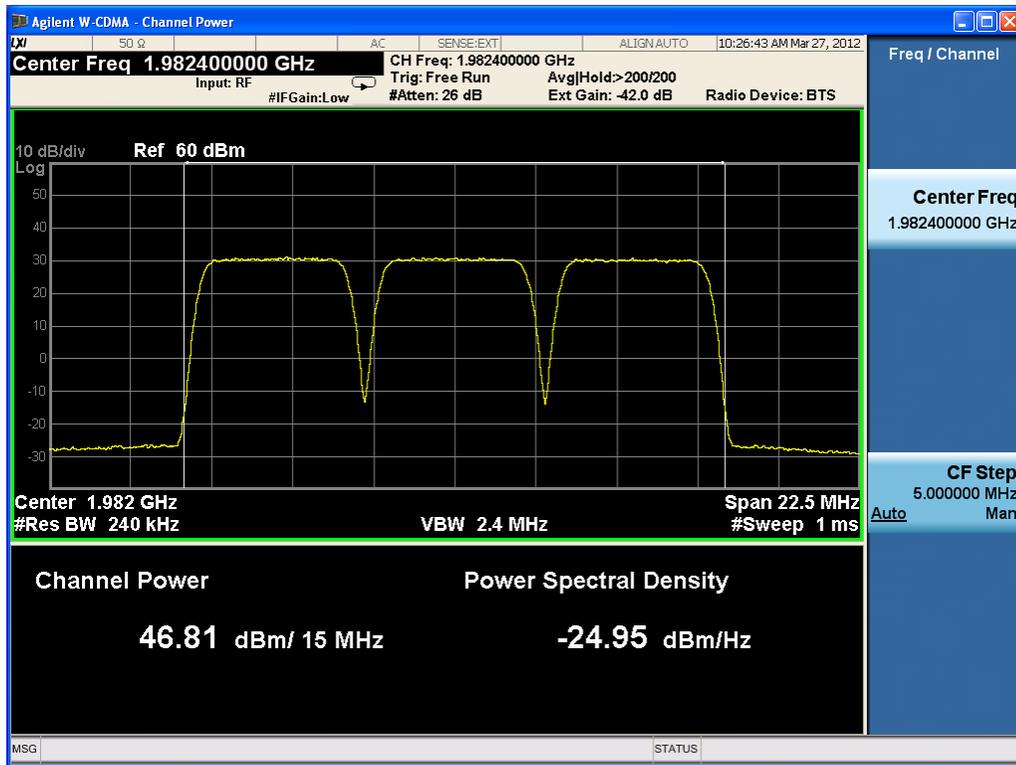




**Three carriers**

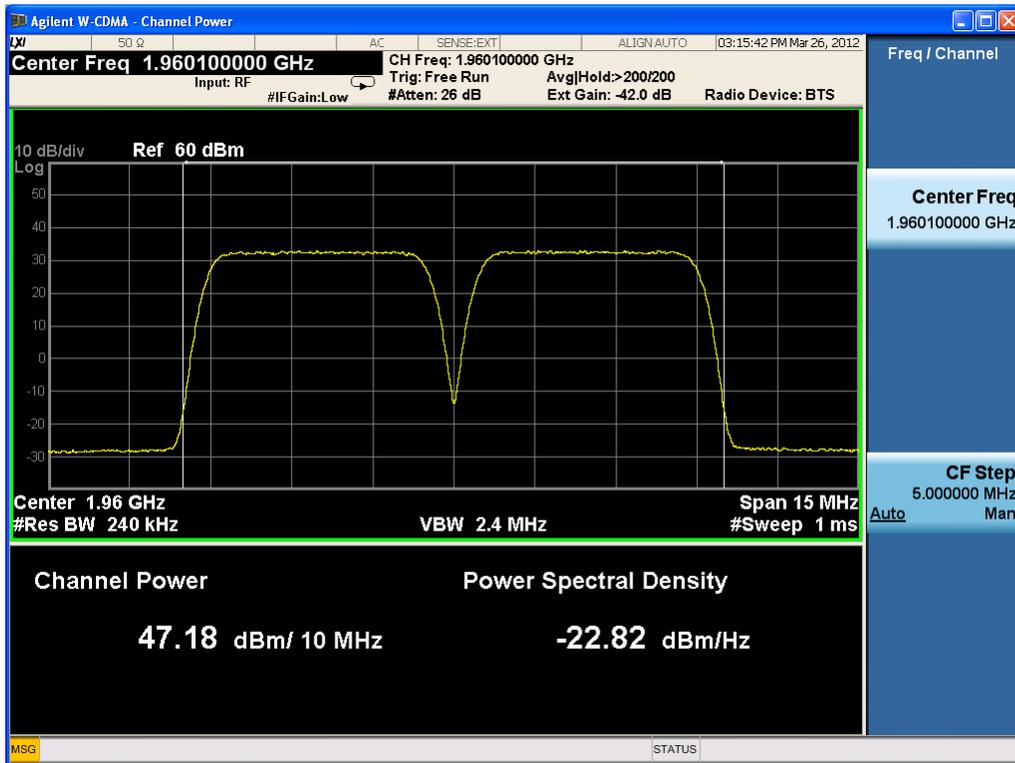
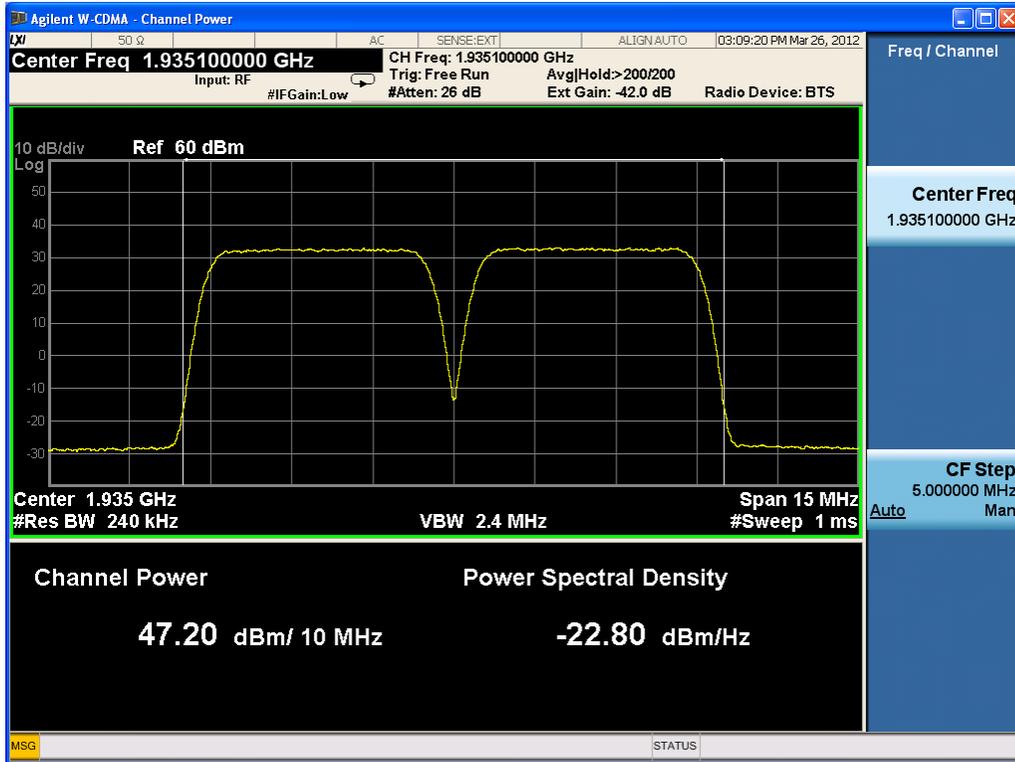
Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1937.6	1932.6/1937.6/1942.6	46.65
1960	1955/1960/1965	47.01
1982.4	1977.4/1982.4/1987.4	46.81

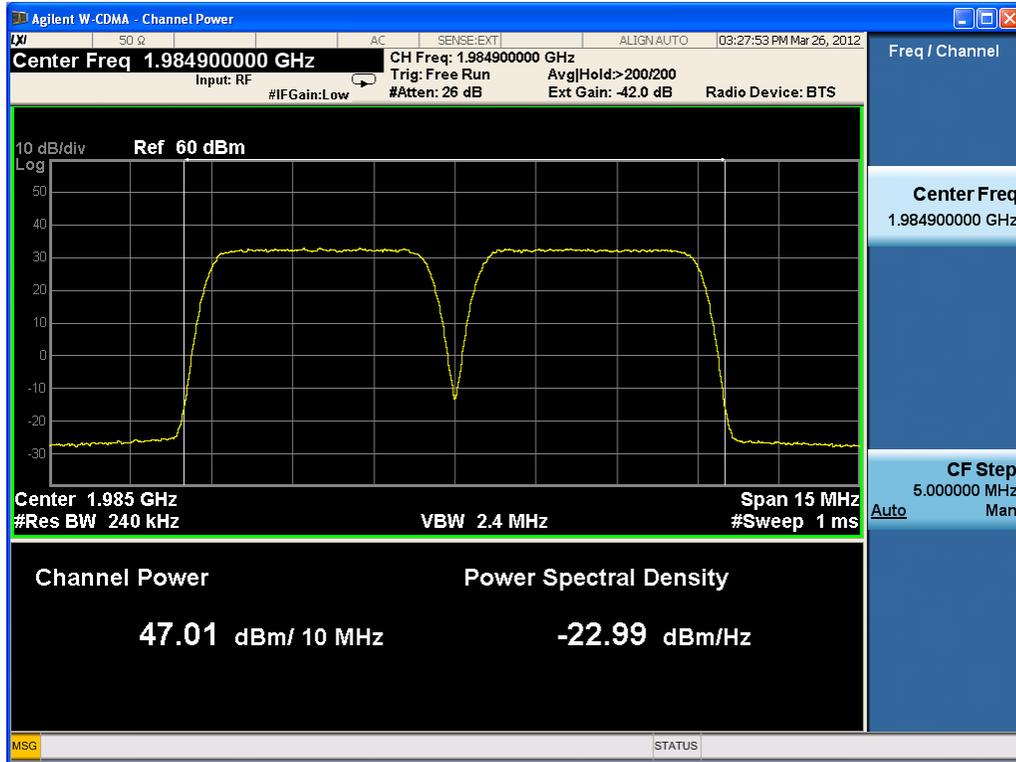




**Two carriers**

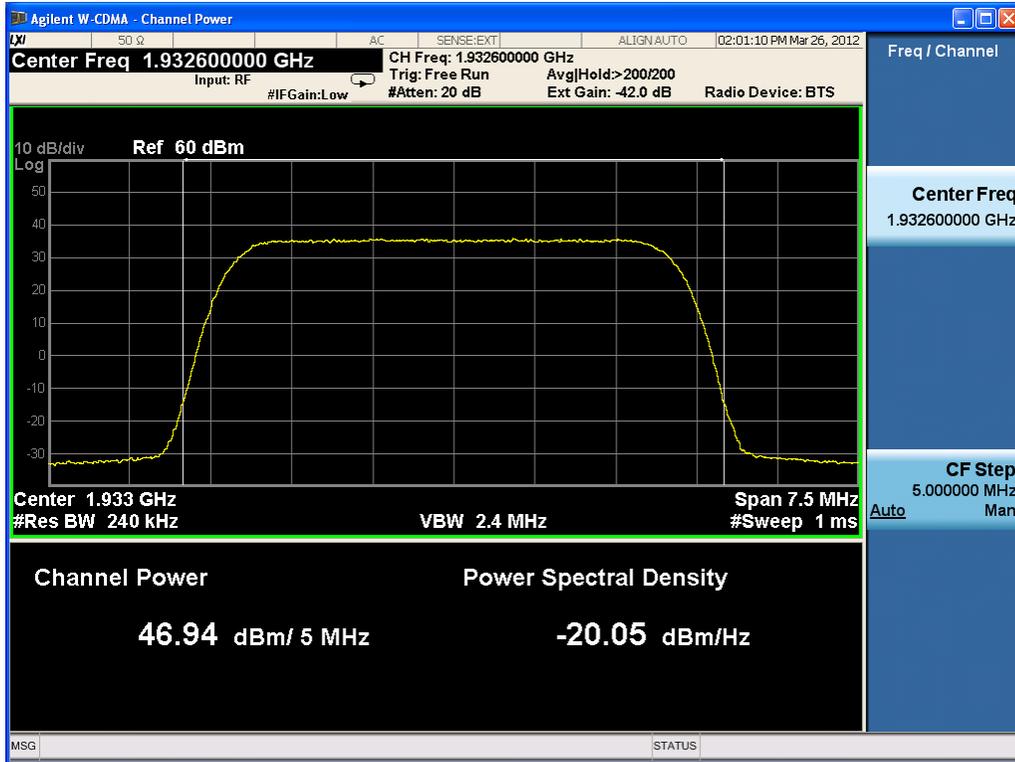
Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1935.1	1932.6/1937.6	47.20
1960.1	1957.6/1962.6	47.18
1984.9	1982.4/1987.4	47.01

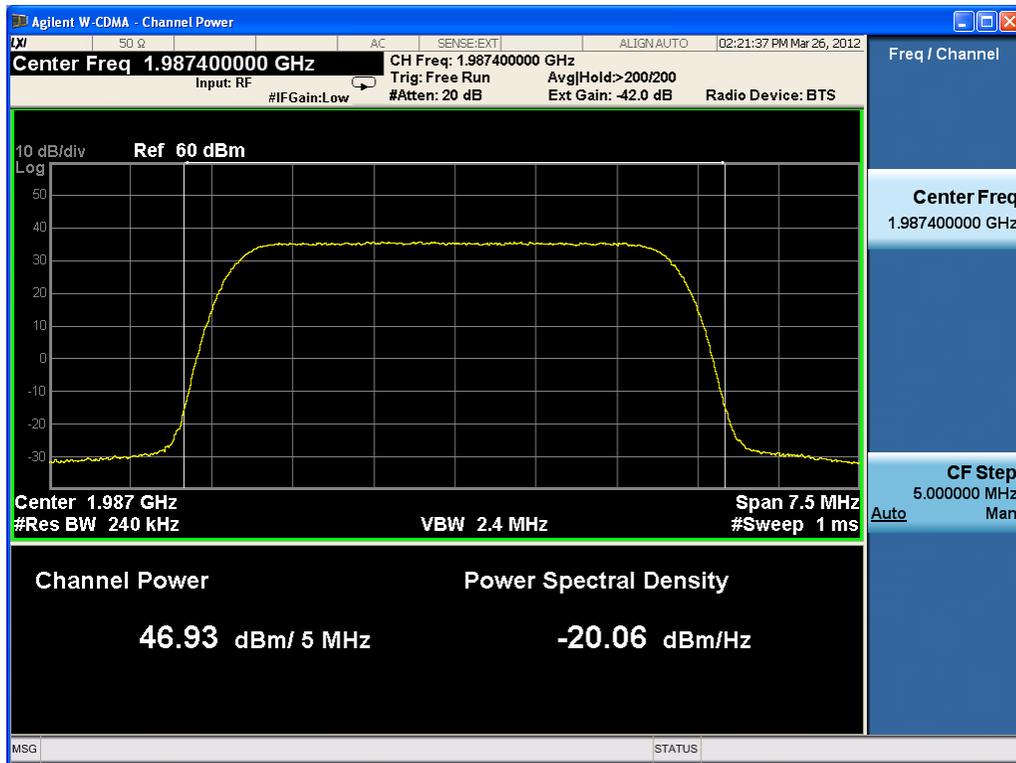




**One carrier**

Center Freq. (MHz)	Frequency (MHz)	Max output Power in dBm
1932.6	1932.6	46.94
1960	1960	47.24
1987.4	1987.4	46.93





# 4.2 RF EXPOSURE

**Applicable standard:** FCC §2.1091 and §1.1037

## Limit

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated. Limits for Maximum Permissible Exposure (MPE)

<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

## Test Data

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = EIRP / 4\pi R^2$$

Where: S = power density

EIRP = equivalent isotropically radiated power=ERP+2.15dB

R = distance to the center of radiation of the antenna=[(ERP+2.15 dB)/ 4πS]<sup>1/2</sup>

Maximum EIRP, In general, the equivalent isotropically radiated power (EIRP) of base transmitters and cellular repeaters must not exceed 1640 Watts.

Frequency is between 1500MHz and 100,000MHz, and the Maximum S=1.0mW/cm<sup>2</sup>, so R=3.61m.

This equipment should be installed and operated with minimum distance 3.61m between the radiator& your body.

**Test Result:** pass

# 4.3 MODULATION CHARACTERISTIC

**Applicable Standard:** FCC §2.1047

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	40dB Attenuator	ATSI150-4-40	11300100204204	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	002	1034	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

## Test Procedure

UMTS digital mode is used by EUT.

## Test Data Environmental Conditions

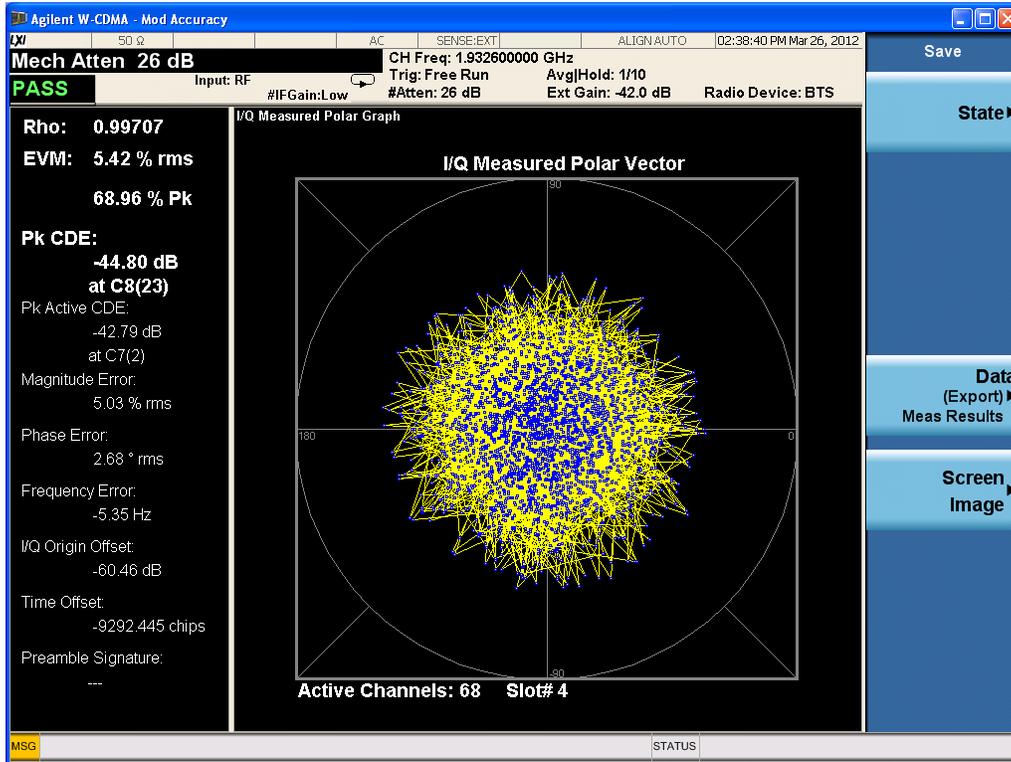
Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

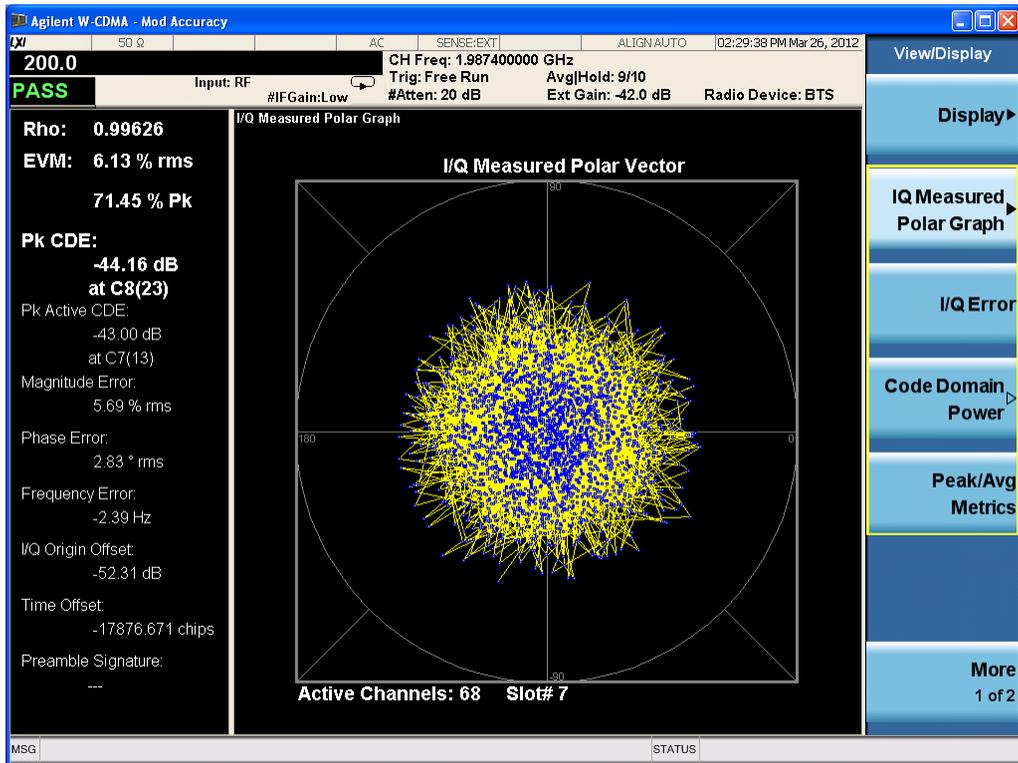
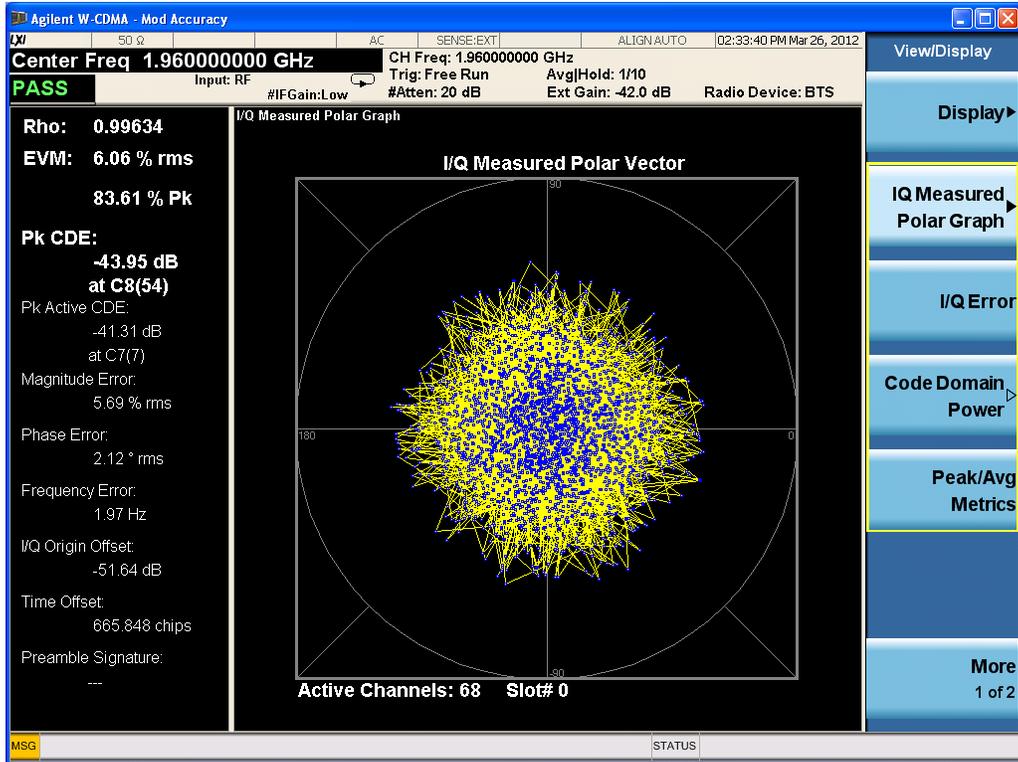
**Test Result:** Pass

**Test Mode:** Transmitting UMTS

### Test Data:

Frequency (MHz)	Rho
1932.6	0.99707
1960	0.99634
1987.4	0.99626





# 4.4 SPURIOUS RADIATED EMISSIONS

**Applicable Standard:** FCC CFR 47, §2.1053

## Test Equipment List and Details

Manufacturer	Equipment	Model	Serial Number	Last Cal.	Cal. Interval
R&S	SIGNAL GENERATOR	SMR20	A00017351	2012-9-26	1 year
Albatross	Anechoic Chamber	3m Site	A00017354	2012-10-29	1 year
R&S	EMI Test Receiver	ESIB26	100058	2012-10-29	1 year
R&S	Ultra Breitband Antennas	HL562	100022	2012-7-29	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100032	2012-7-29	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100446	2012-7-29	1 year
SCHWARZ-BECK K	Biconical Antenna	VUBA9117	9117-122	2012-7-29	1 year

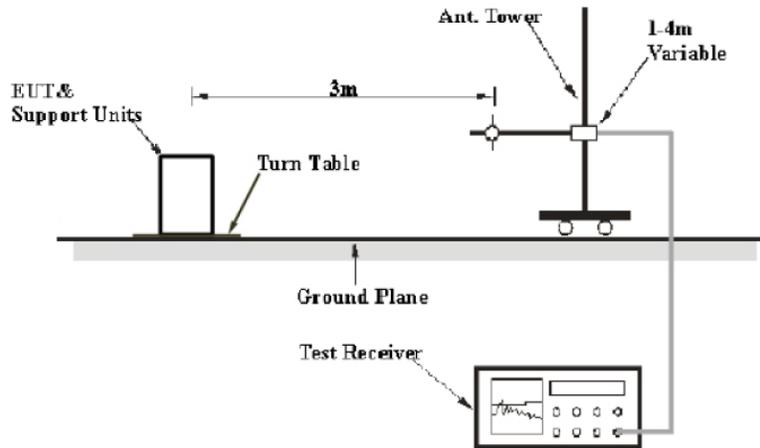
**\*statement of traceability:** ZTE Corporation Testing lab attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiated emissions measurement at the EMC lab of ZTE Corp. is 3.6dB.

### EUT Setup



The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the FCC part 2.1053. The specification used was the FCC 2.1053 limits.

## Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TX pwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 43+10 Lg P (power out in Watts)

The resolution bandwidth of the spectrum analyzer was set at 100KHz for 30MHz to 1GHz scanning, set at 1MHz or 3MHz for 1GHz to 20GHz scanning.

## Test Results Summary: PASS

## Environmental Conditions

Temperature:	26°C
Relative Humidity:	60 %
ATM Pressure:	1009 mbar

## Test data

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (GHz)	Amp. (dB $\mu$ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
63.046092	26.01	V	-70.1	-27.24	0.6	-97.94	2.15	-100.09	-13	87.09
634.549098	26.43	V	-69.68	-1.09	2.1	-72.87	2.15	-75.02	-13	62.02
974.729459	31.16	V	-72.63	-2.82	2.6	-78.05	2.15	-80.2	-13	67.2
1384.76954	46.62	V	-60.9	4.25	3.1	-59.75	2.15	-61.9	-13	48.9
2991.98397	58.48	V	-52.49	7.95	4.6	-49.14	2.15	-51.29	-13	38.29
169.95992	23.09	H	-80.17	-3.24	1.1	-84.51	2.15	-86.66	-13	73.66
607.334669	27.78	H	-73.12	-1.39	2	-76.51	2.15	-78.66	-13	65.66
992.224449	31.09	H	-72.3	-2.59	2.7	-77.59	2.15	-79.74	-13	66.74
1388.77756	46.41	H	-62.22	4.25	3.1	-61.07	2.15	-63.22	-13	50.22
1981.96393	90.64	H	-18.3	6.55	3.8	-15.55	2.15	-17.7	-13	4.7
2963.92786	57.49	H	-48.71	7.95	4.6	-45.36	2.15	-47.51	-13	34.51

### Radiation emission spurious below 3GHz

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (GHz)	Amp. (dB $\mu$ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
3953.90782	49.47	V	-46.24	7.75	5.3	-43.79	2.15	-45.94	-13	32.94
5276.55311	45.53	V	-50.55	8.55	6.2	-48.2	2.15	-50.35	-13	37.35
5941.88377	58.8	V	-45.29	9.05	6.6	-42.84	2.15	-44.99	-13	31.99
9755.51102	54.47	V	-53.45	9.95	9	-52.5	2.15	-54.65	-13	41.65
13282.5651	59.36	V	-41.68	11.85	10.2	-40.03	2.15	-42.18	-13	29.18
17933.8677	72.31	V	-38.96	8.95	12.2	-42.21	2.15	-44.36	-13	31.36
3961.92385	50.92	H	-51.84	7.75	5.3	-49.39	2.15	-51.54	-13	38.54
5268.53707	45.53	H	-55.77	8.55	6.2	-53.42	2.15	-55.57	-13	42.57
5941.88377	54.63	H	-49.16	9.05	6.6	-46.71	2.15	-48.86	-13	35.86
9843.68738	53.43	H	-55.52	9.95	8.9	-54.47	2.15	-56.62	-13	43.62
13348.6974	58.86	H	-50.58	11.85	10.2	-48.93	2.15	-51.08	-13	38.08
17867.7355	72.1	H	-34.51	8.95	12.2	-37.76	2.15	-39.91	-13	26.91

### Radiation emission spurious above 3GHz

# 4.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

**Applicable Standard:** FCC§2.1051, §24.238

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified.

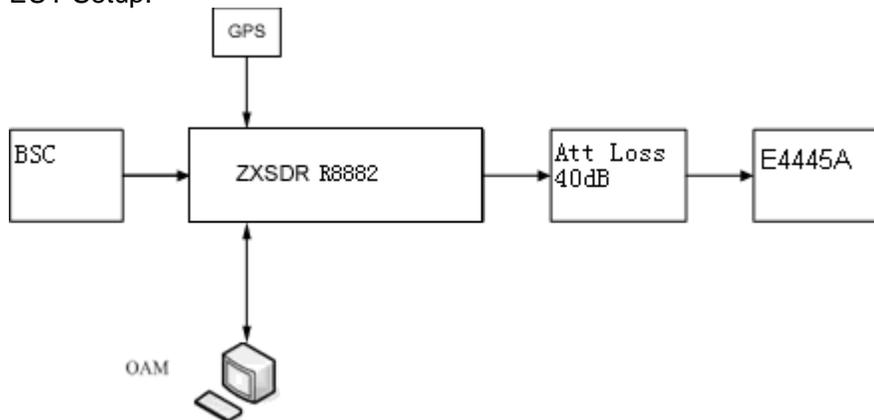
## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2012-4-10	2013-4-9
Atten	40dB Attenuator	ATSI150-4-40	11300100204204	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	002	1034	2012-4-9	2013-4-8

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements , traceable to NIST.

## Test Procedure

EUT Setup:



REMARKS: Attenuator loss (dB)=40dB, Cable Loss (dB)=2dB.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz for 30MHz to 1GHz scanning, set at 1MHz for 1GHz to 20GHz scanning. Sufficient scans were taken to

show any out of band emissions up to 10th harmonic.

### Test Data Environmental Conditions

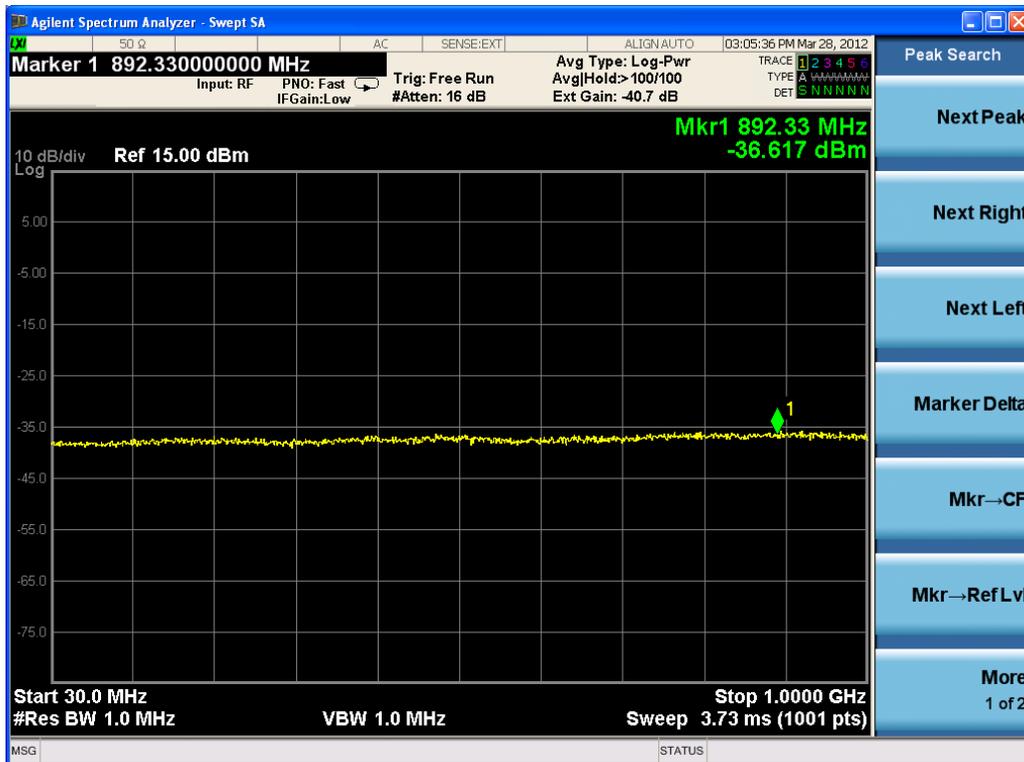
Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

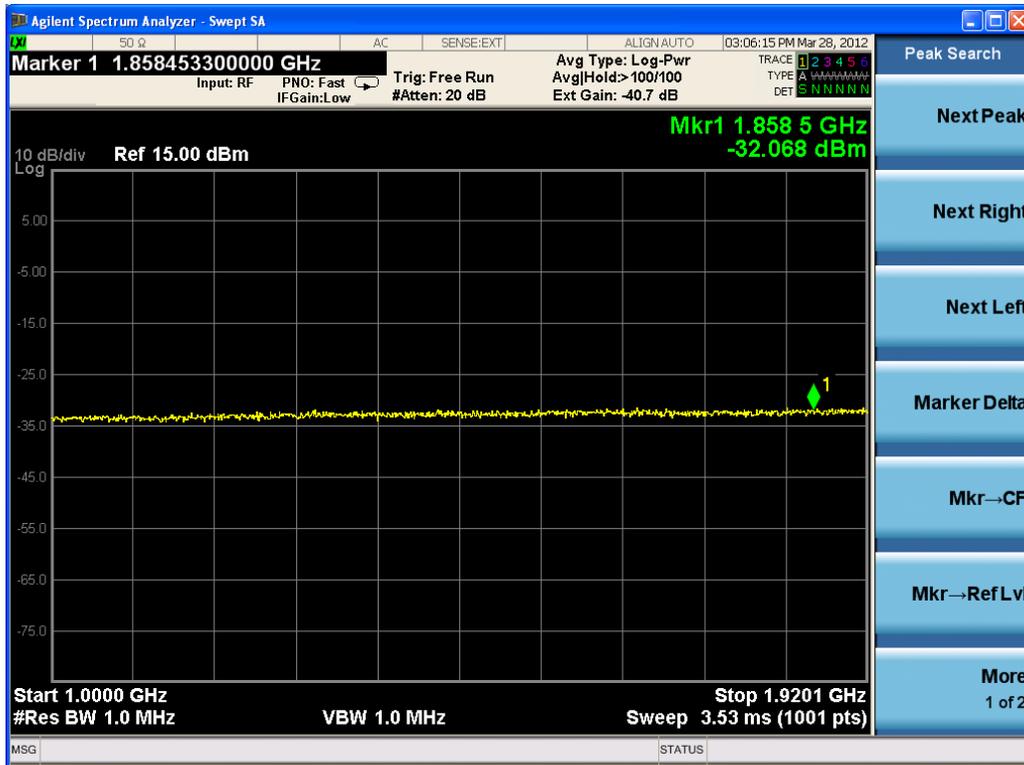
**Test Result:** Pass

**Test Mode:** Transmitting UMTS

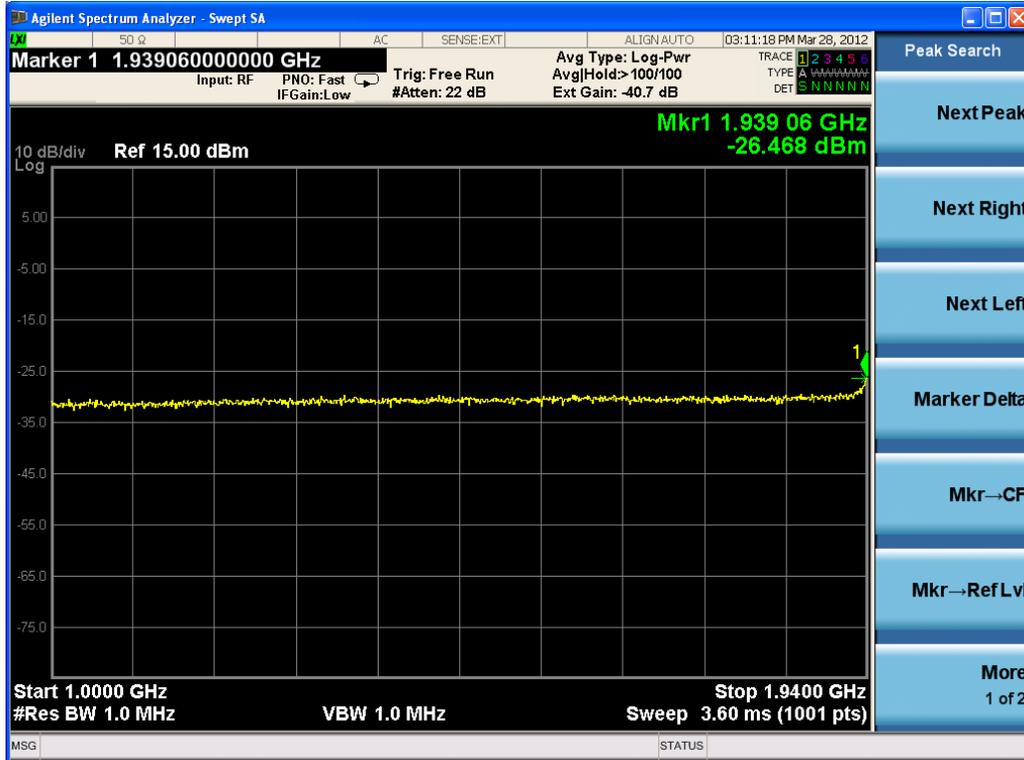
### Test Data:

Four Carriers (working in bottom frequency)



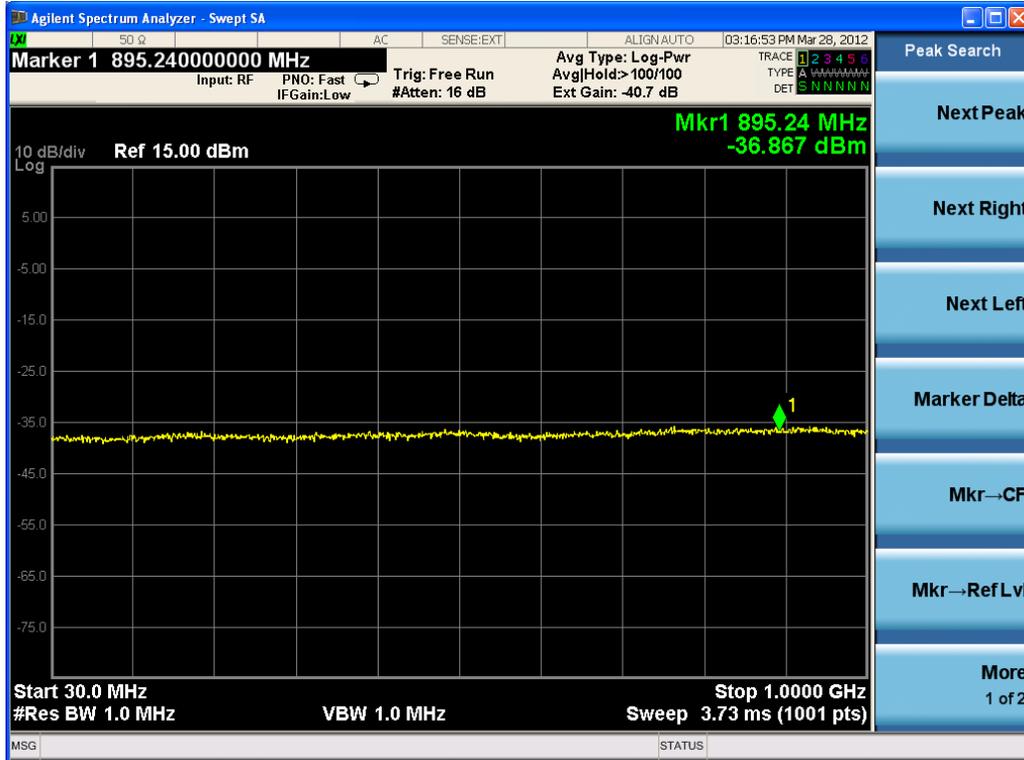


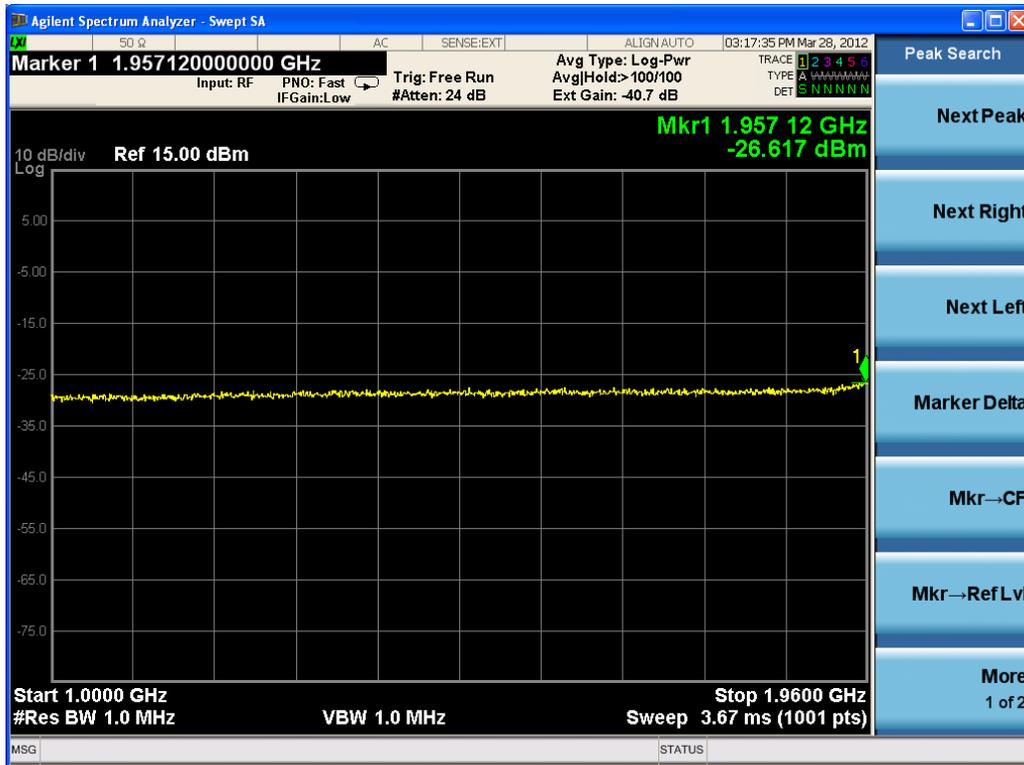
Four carriers (working in middle frequency)



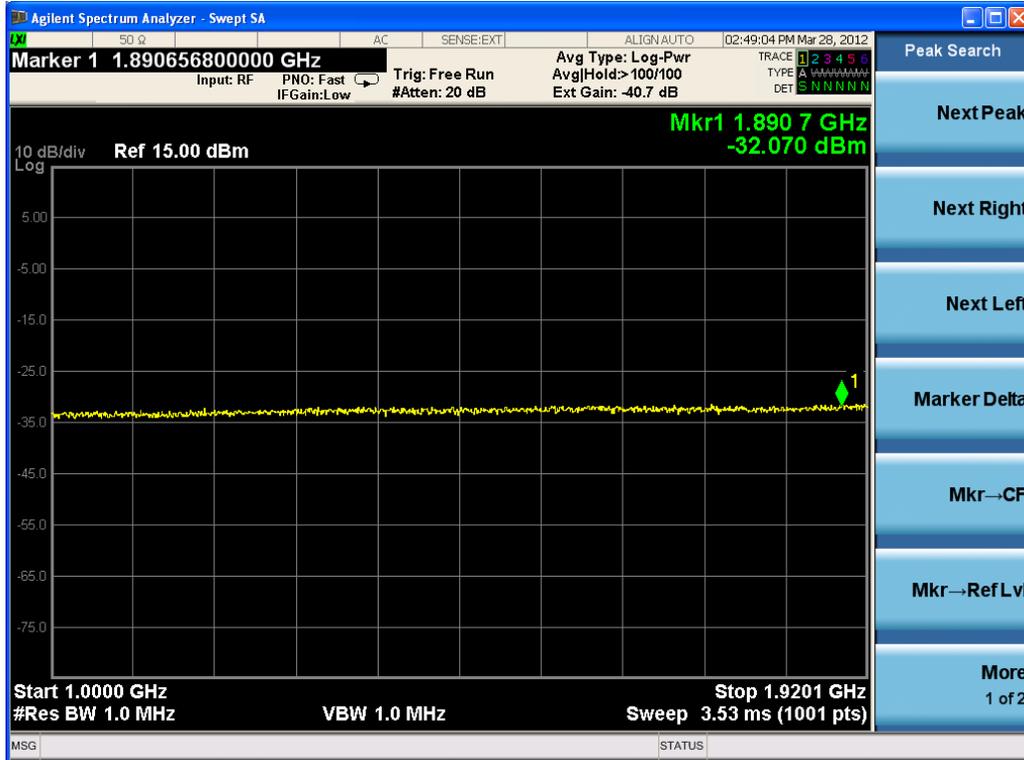
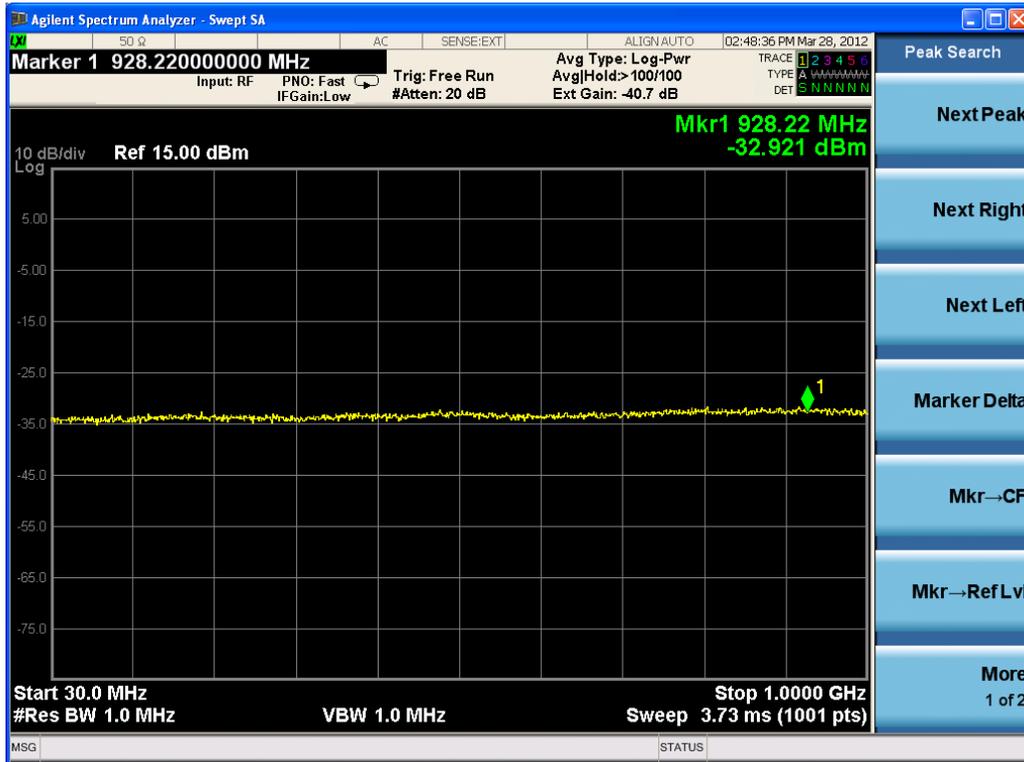


Four Carriers (working in top frequency)





Three carriers (working in bottom frequency)





Three carriers (working in middle frequency)

