

FCC MEASUREMENT AND TEST REPORT

For

ZTE Corporation

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

FCC ID: Q78-880280

Nov21, 2011

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: CDMA Remote Radio Unit
Test Engineer:	<i>Bloom</i>
Report No.:	FCC-2011-070
Test Date:	Sep 01 – Nov20, 2011
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Note: The test report is specially limited to the above company and this particular sample only. It may not be duplicated without prior written consent of ZTE Corporation. This report must not be used by the client to claim product certification 、 approval 、 or endorsement by any agency of the US Government.

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2 GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The ZTE Corporation's product, model number: ZXSDR BS8802 C100 or the "EUT" as referred to in this report is a CDMA Remote Radio Unit.

Technical specification:

Size: 260 mm × 180 mm × 58 mm (H x W x D)

Adapter: input 100-240Vac; 1.5A; 50/60Hz Output: 13Vdc, 4.5A.

Input voltage: 85 - 264Vac

Frequency range: 869MHz to 889MHz

(Bottom frequency is about 869.82MHz, Middle frequency is about 879.03MHz, Top frequency is about 888.24MHz).

Max RF output power: 27.8dBm

Gain of the antenna: 2.15dBi

Modulation type of emission: QPSK

Appearance of EUT:



Objective

This Type approval report is prepared on behalf of ZTE Corporation in accordance with Part 2, Part 15, Part 22 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.: 373926. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

3 SYSTEM TEST CONFIGURATION

Description of Test Configuration

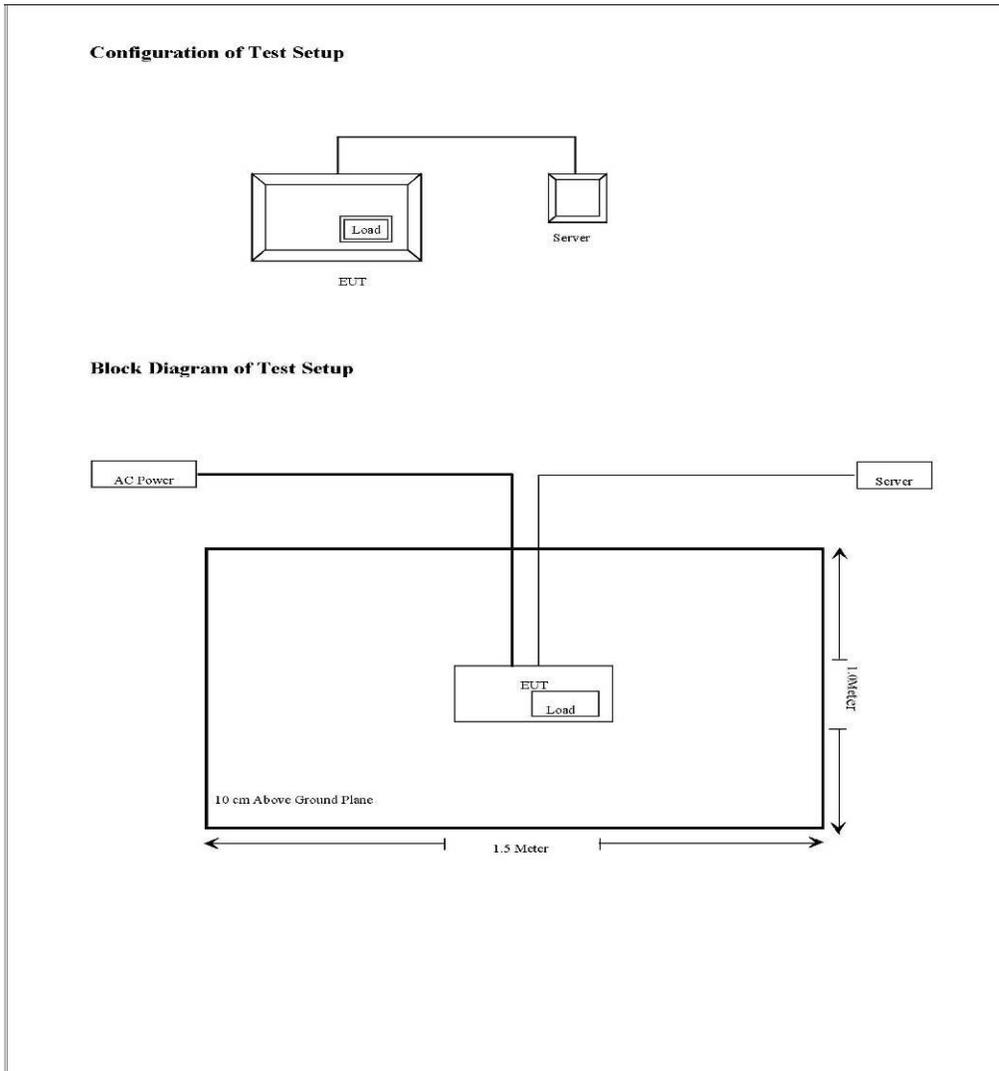
Justification

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.



4 SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1046 ,§22.913	Transmitter output Power	Compliant
§2.1091 ,§1.1037	RF Exposure	Compliant
§2.1047	Modulation Characteristic	Compliant
§2.1053, §22.917	Spurious Radiated Emissions	Compliant
§2.1051, §22.917	Spurious Emissions AT Antenna Terminals	Compliant
§2.1049 §22.917	Occupied Bandwidth	Compliant
§2.1051, §22.917	Band Edge	Compliant
§ 2.1055, §22.355	Frequency stability	Compliant

5 TRANSMITTER OUTPUT POWER

Applicable Standard: FCC §2.1046 §22.913

According to FCC §2.1046 & §22.913, the ERP (equivalent radiated power) must not exceed 500 Watts.

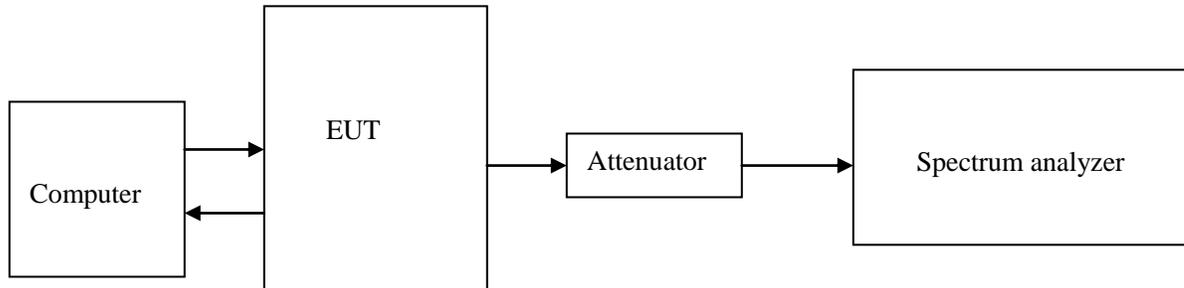
Note: ERP = Max output Power + Antenna gain - Cable loss - 2.15

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2011-4-8	2012-4-7
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	004	1034	2011-4-8	2012-4-7

***statement of traceability:** ZTE Corporation Reliability Testing Center attests that all calibration has 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 30dB, Cable Loss is about 4dB

Environmental Conditions

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

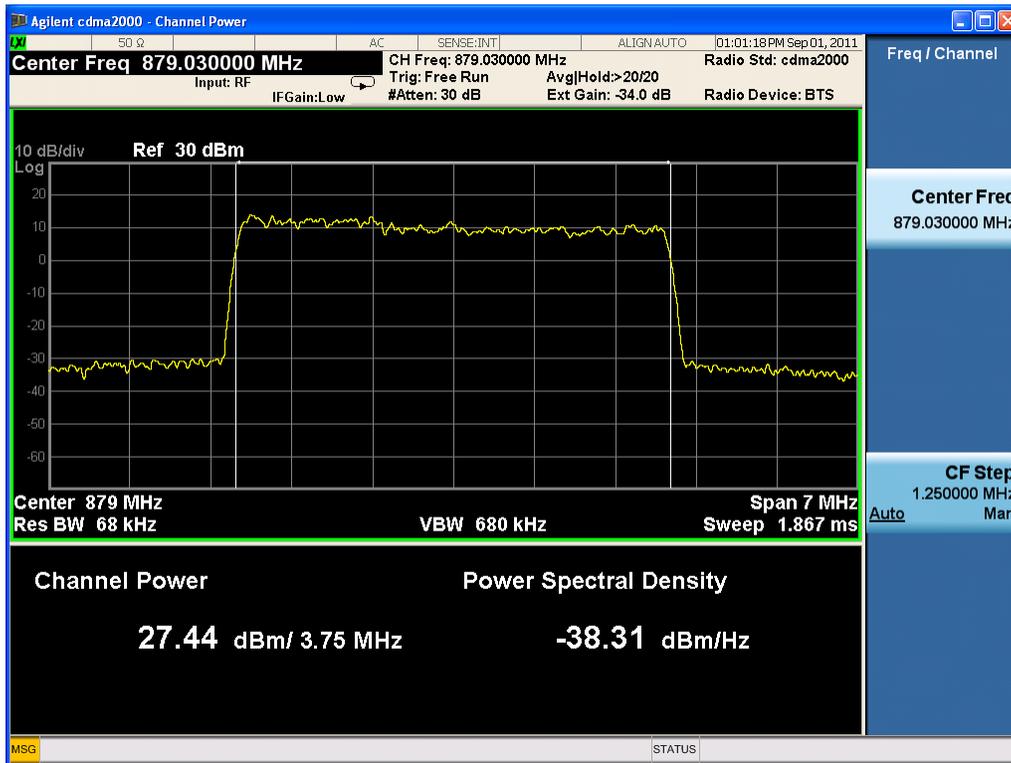
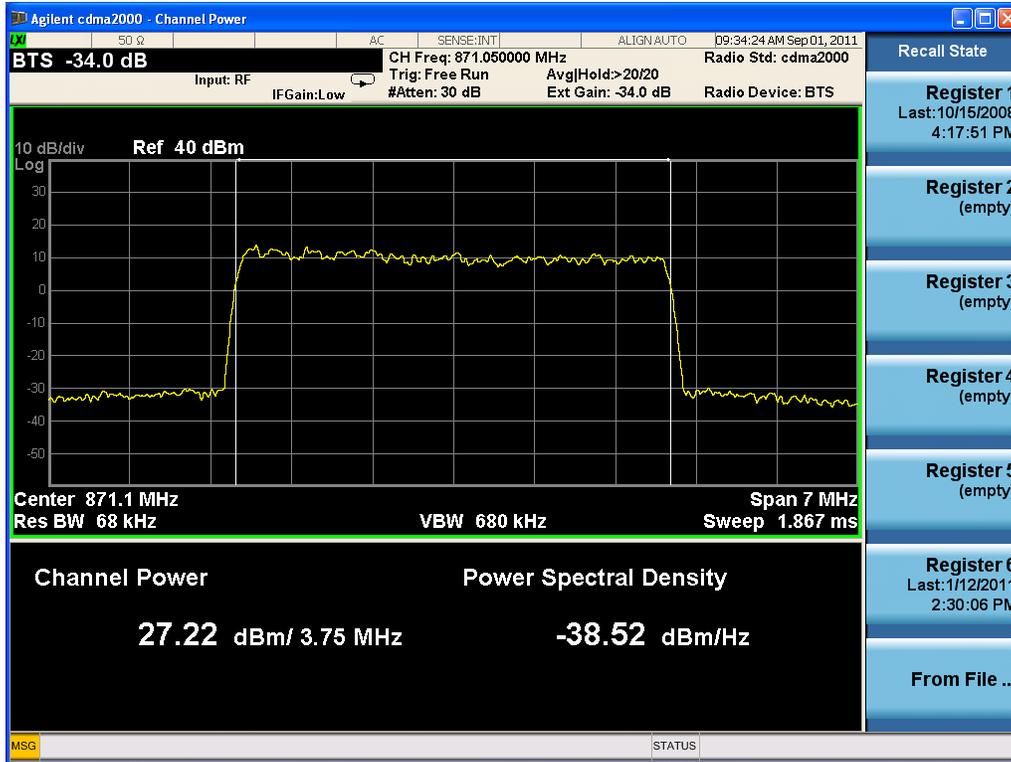
Test Result: Pass

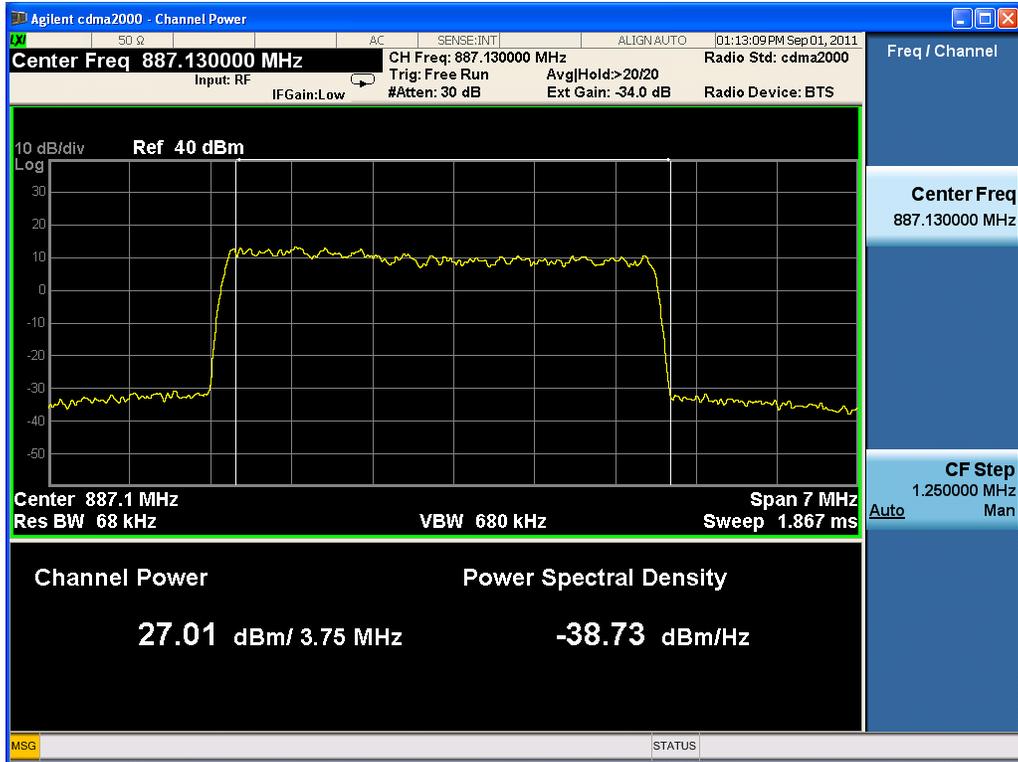
Test Mode: Transmitting CDMA

Test Data:

Three carriers

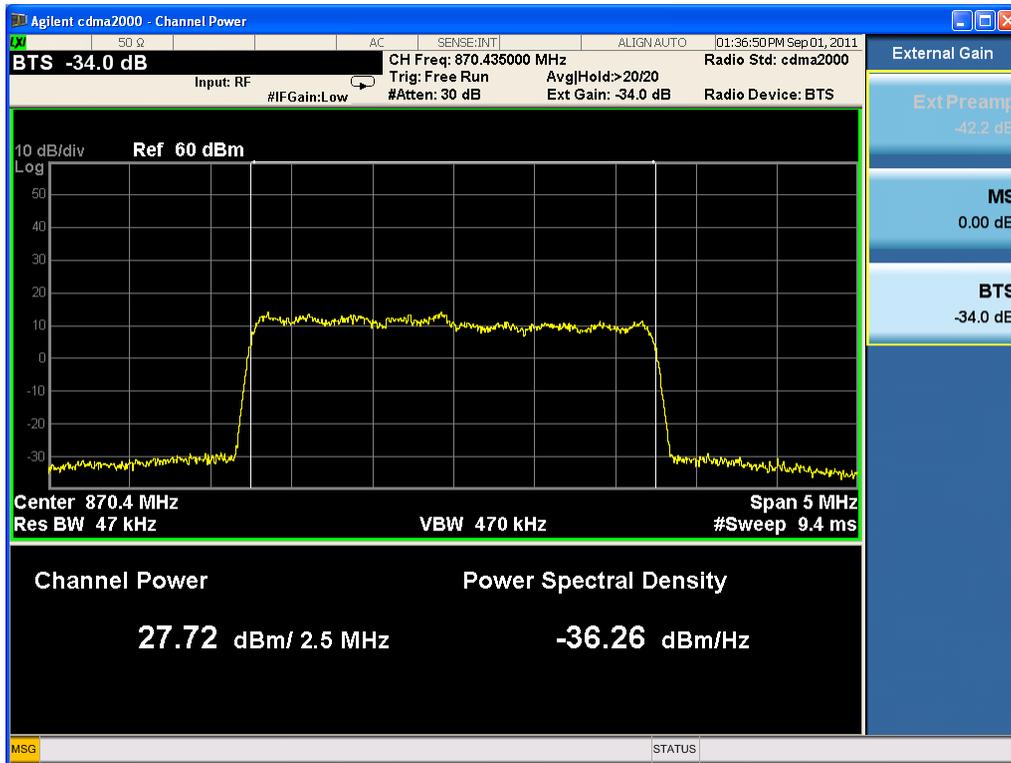
Center Freq. (MHz)	Frequency (MHz)	Max output Power (dBm)	Antenna gain (dBi)	Dipole Antenna (dB)	ERP (dBm)	Total Power in mW
871.05	869.82/871.05/872.28	27.22	2.15	2.15	27.22	527.2
879.03	877.8/879.03/888.26	27.44	2.15	2.15	27.44	554.6
887.13	885.78/887.01/888.24	27.01	2.15	2.15	27.01	502.3

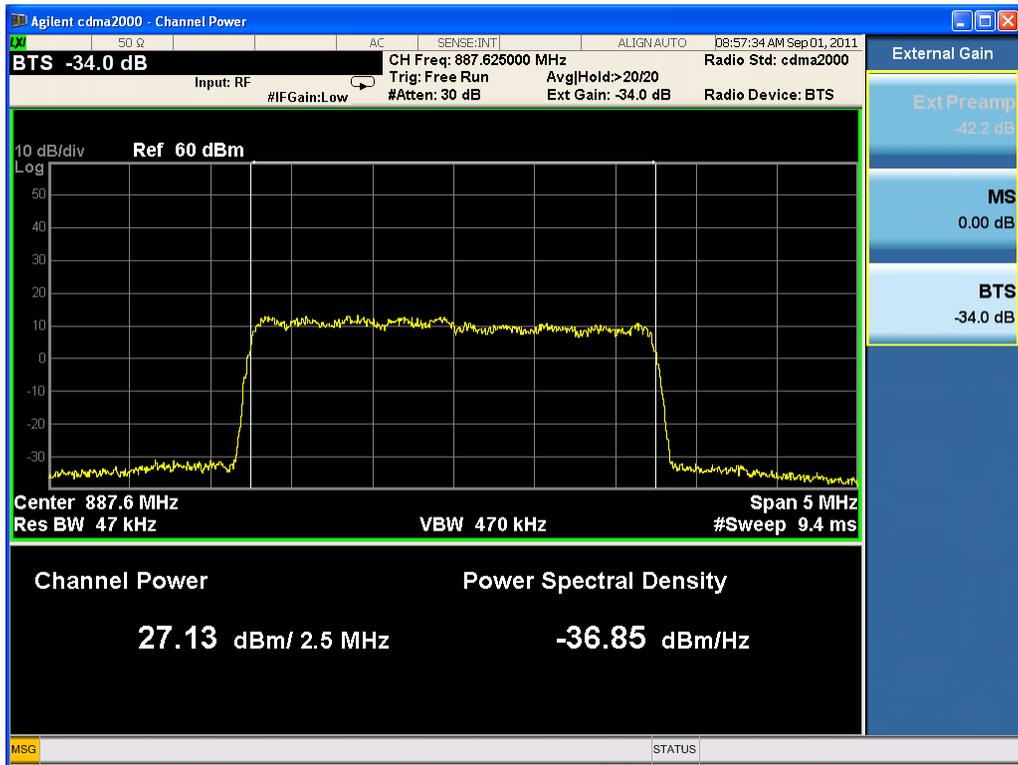
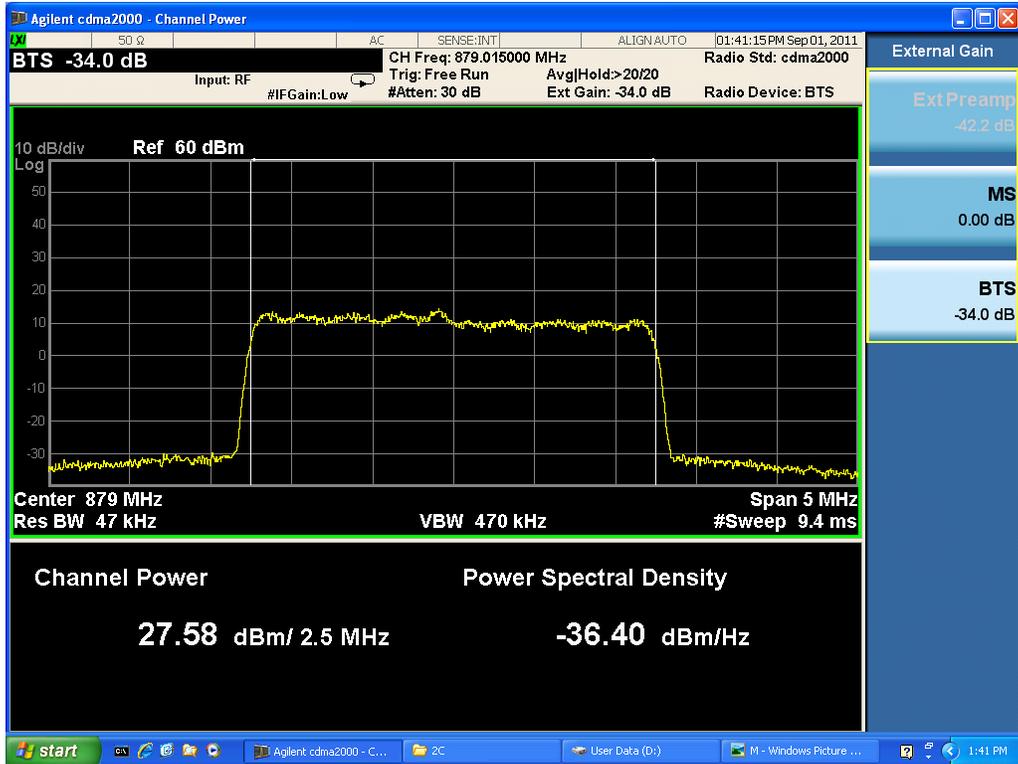




Two carriers

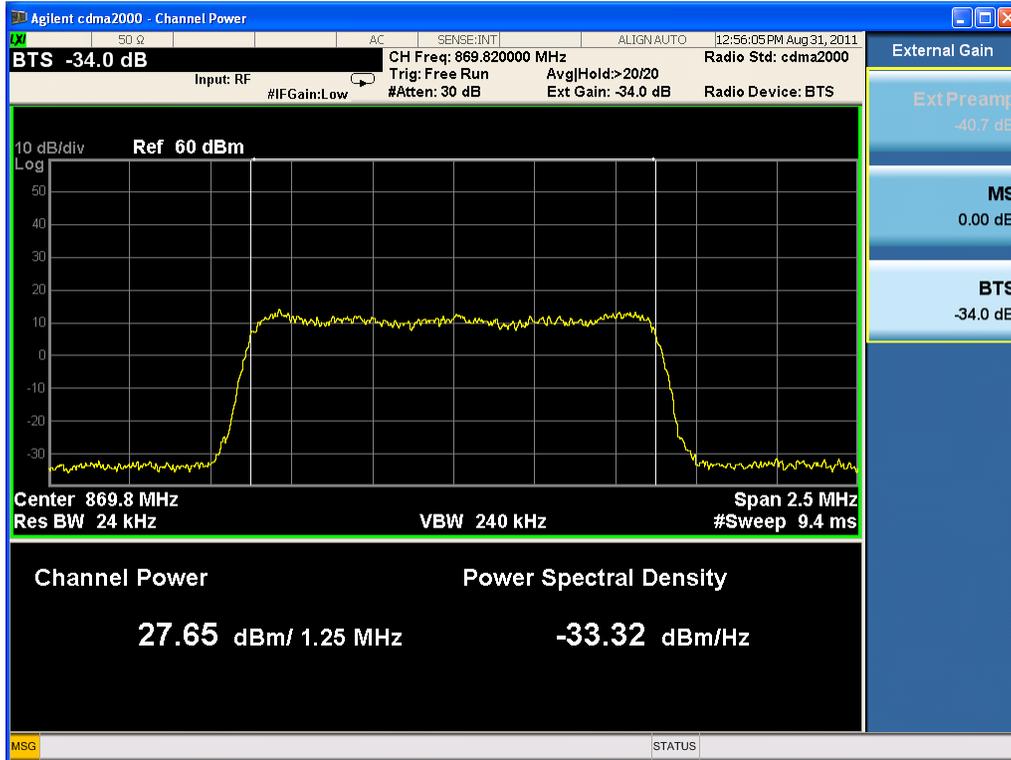
Center Freq. (MHz)	Frequency (MHz)	Max output Power (dBm)	Antenna gain (dBi)	Dipole Antenna (dB)	ERP (dBm)	Total Power in mW
870.435	869.82 /871.05	27.72	2.15	2.15	27.72	591.6
879.015	878.4 /879.63	27.58	2.15	2.15	27.58	572.8
887.625	887.01/ 888.24	27.13	2.15	2.15	27.13	516.4

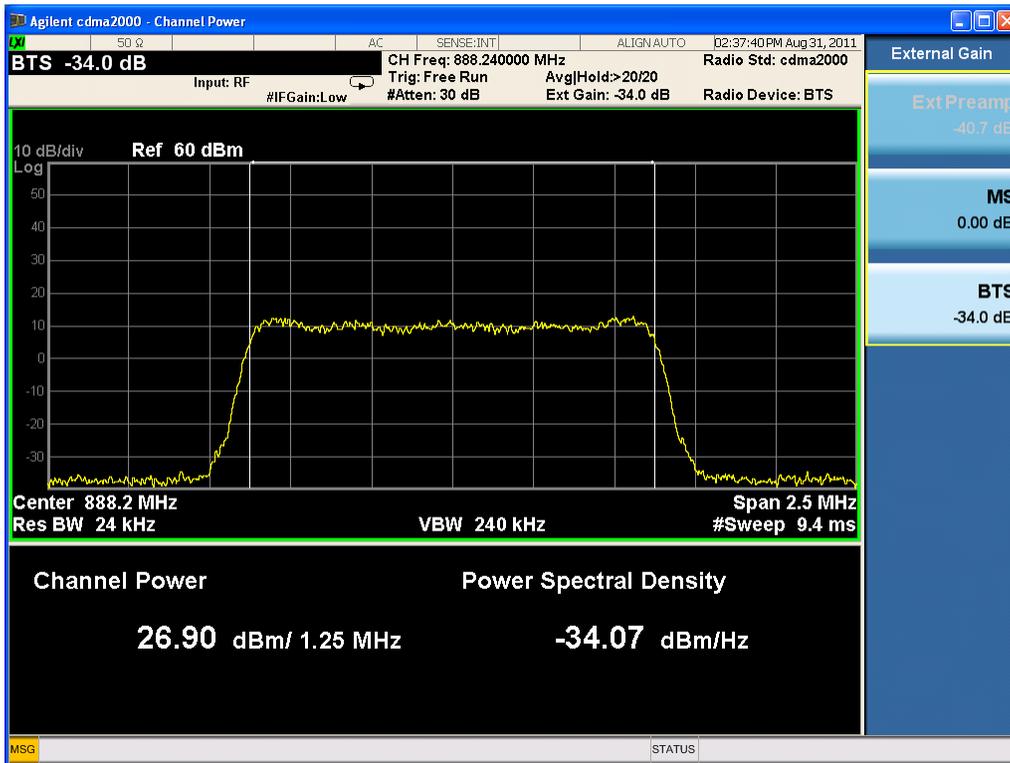
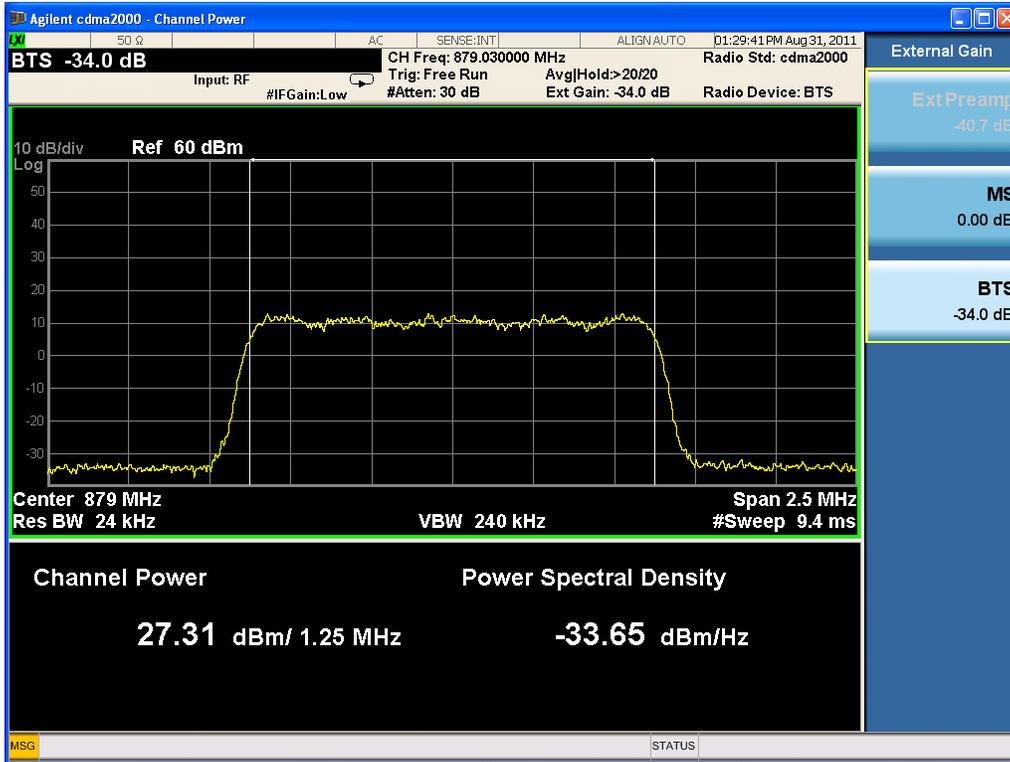




One carrier

Center Freq. (MHz)	Frequency (MHz)	Max output Power (dBm)	Antenna gain (dBi)	Dipole Antenna (dB)	ERP (dBm)	Total Power in mW
869.82	869.82	27.65	2.15	2.15	27.65	582.1
879.03	879.03	27.31	2.15	2.15	27.31	538.3
888.24	888.24	26.90	2.15	2.15	26.90	489.8





6 RF EXPOSURE

Applicable standard: FCC §2.1091 §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) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	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
 $S = PG / 4\pi R^2$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 27.72(dBm) Maximum peak output power at antenna input terminals: 0.59 (W), the cable loss is 0dB

Prediction distance: 400 (cm)

Predication frequency: 870.435(MHz)

Antenna Gain (typical): 2.15(dBi)

Power density at predication frequency at 400 cm: 0.00048(mW/cm²)

MPE limit for uncontrolled exposure at prediction frequency: 0.58029 (mW/cm²)

Test Result: pass

7 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	2011-4-8	2012-4-7
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	004	1034	2011-4-8	2012-4-7

***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

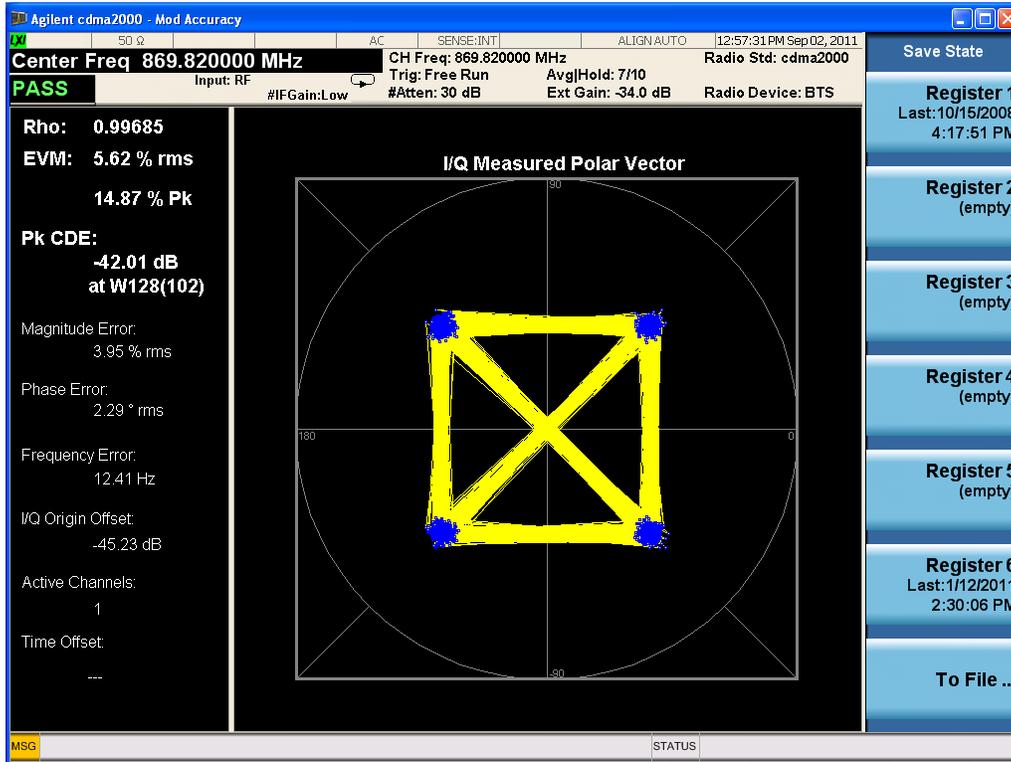
Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

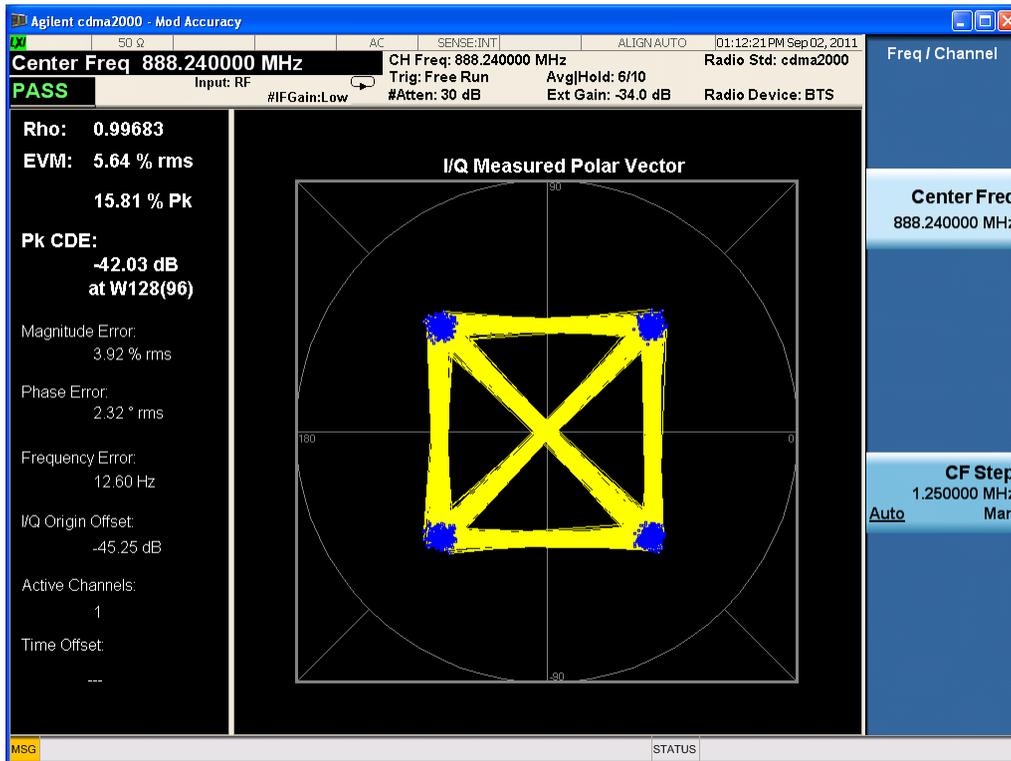
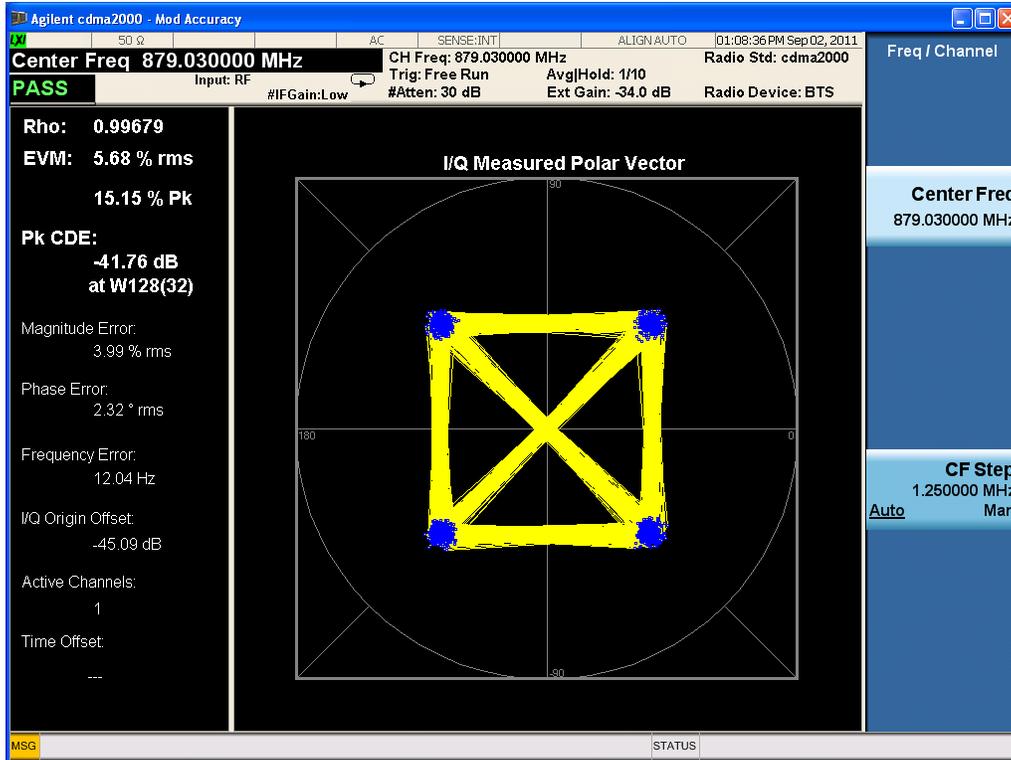
Test Result: Pass

Test Mode: Transmitting CDMA

Test Data:

Frequency (MHz)	Rho
869.82	0.99685
879.03	0.99679
888.24	0.99683





8 SPURIOUS RADIATED EMISSIONS

Applicable Standard: FCC CFR 47, §2.1053

Test Equipment List and Details

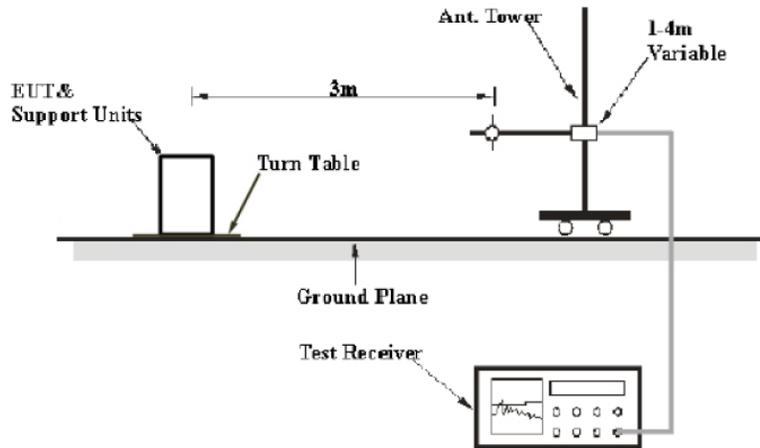
Manufacturer	Equipment	Model	Serial Number	Last Cal.	Cal. Interval
R&S	SIGNAL GENERATOR	SMR20	A00017351	2011-09-26	1 year
Albatross	Anechoic Chamber	3m Site	A00017354	2011-11-02	1 year
R&S	EMI Test Receiver	ESIB26	100058	2011-10-29	1 year
R&S	Ultra Breitband Antennas	HL562	100022	2011-7-29	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100032	2011-7-29	1 year
R&S	Double-Ridged Waveguide Horn Antenna	HF906	100446	2011-7-29	1 year
SCHWARZ-BECK K	Biconical Antenna	VUBA9117	9117-122	2011-7-29	1 year

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. 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 teeth 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 1 percent as specified for 30MHz to 1GHz scanning, set at 1MHz 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 μ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
33.887776	27.65	V	-31.43	-42.03	0.3	-73.76	2.15	-75.91	-13	62.91
115.531062	22.2	V	-62.72	-12.48	0.8	-76	2.15	-78.15	-13	65.15
249.659319	21.09	V	-76.46	1.49	1.3	-76.27	2.15	-78.42	-13	65.42
735.631263	30.41	V	-67.63	-0.95	2.3	-70.88	2.15	-73.03	-13	60.03
1873.7475	47.04	V	-60.32	6.55	3.6	-57.37	2.15	-59.52	-13	46.52
2991.98397	54.76	V	-46.98	7.95	4.6	-43.63	2.15	-45.78	-13	32.78
30	33.37	H	-19.37	-43.49	0.3	-63.16	2.15	-65.31	-13	52.31
113.587174	21.72	H	-64.44	-13.47	0.8	-78.71	2.15	-80.86	-13	67.86
294.368737	25.23	H	-73.89	0.55	1.4	-74.74	2.15	-76.89	-13	63.89
751.182365	30.44	H	-68.51	-0.58	2.3	-71.39	2.15	-73.54	-13	60.54
1857.71543	47.63	H	-56.03	6.55	3.6	-53.08	2.15	-55.23	-13	42.23
2799.5992	54.35	H	-49.76	7.95	4.5	-46.31	2.15	-48.46	-13	35.46

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 μ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
3328.65732	46.08	V	-57.18	7.75	4.9	-54.33	2.15	-56.48	-13	43.48
4851.70341	44.39	V	-56.51	9.15	5.9	-53.26	2.15	-55.41	-13	42.41
6134.26854	49.9	V	-53.49	9.05	6.8	-51.24	2.15	-53.39	-13	40.39
7852.70541	51.2	V	-50.1	9.25	7.9	-48.75	2.15	-50.9	-13	37.9
9846.19239	57.38	V	-51.56	9.95	8.9	-50.51	2.15	-52.66	-13	39.66
12219.9399	57.54	V	-49.43	12.05	9.8	-47.18	2.15	-49.33	-13	36.33
3328.65732	49.68	H	-51.29	7.75	4.9	-48.44	2.15	-50.59	-13	37.59
4194.38878	44.51	H	-63.09	7.95	5.5	-60.64	2.15	-62.79	-13	49.79
6182.36473	49.33	H	-59.72	9.05	6.9	-57.57	2.15	-59.72	-13	46.72
7864.22846	50.91	H	-61.44	9.25	7.9	-60.09	2.15	-62.24	-13	49.24
9869.23848	55.69	H	-53.13	9.95	8.8	-51.98	2.15	-54.13	-13	41.13
11874.2485	57.19	H	-54.24	11.85	9.7	-52.09	2.15	-54.24	-13	41.24

Radiation emission spurious above 3GHz

9 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard: FCC§2.1051, §22.917

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

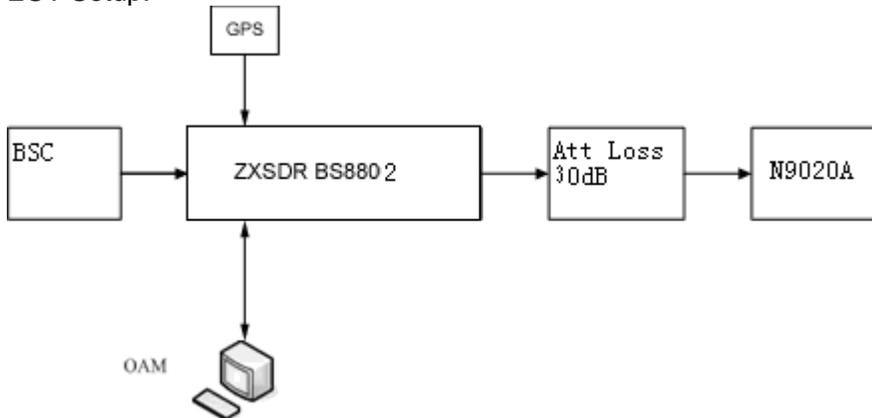
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2011-4-8	2012-4-7
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	004	1034	2011-4-8	2012-4-7

***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)=4dB.

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 30 kHz for 9KHz to 30MHz band, set at 100KHz for 30MHz to 1GHz band, set at 1MHz for 1GHz to 10GHz

band. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data Environmental Conditions

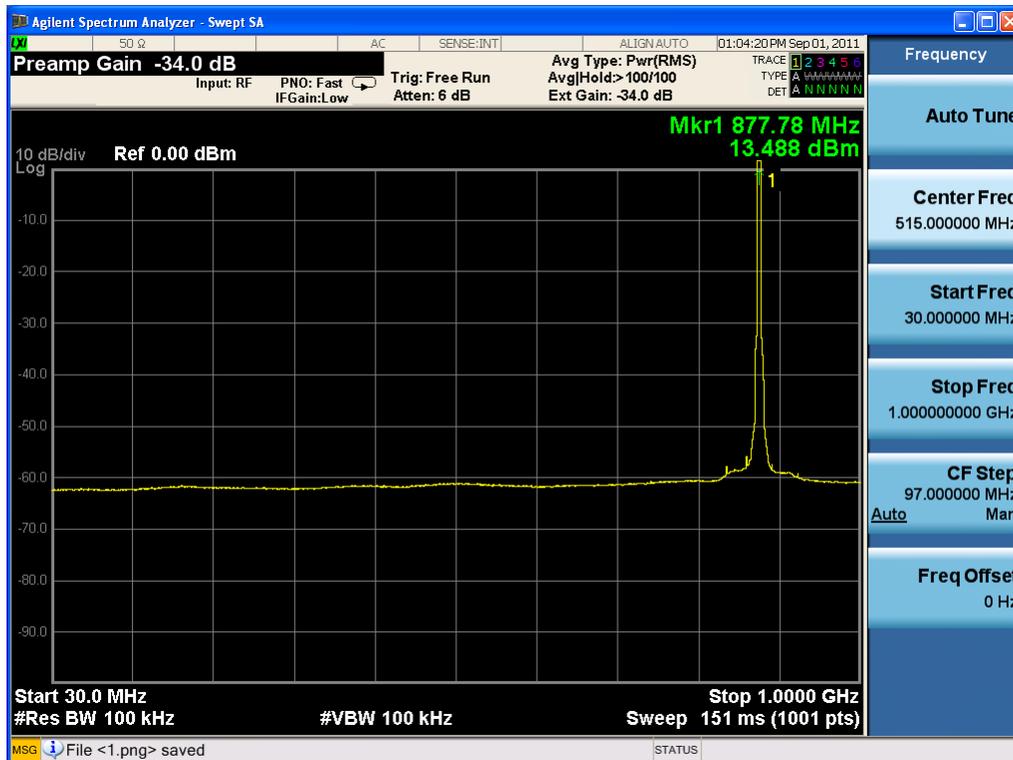
Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

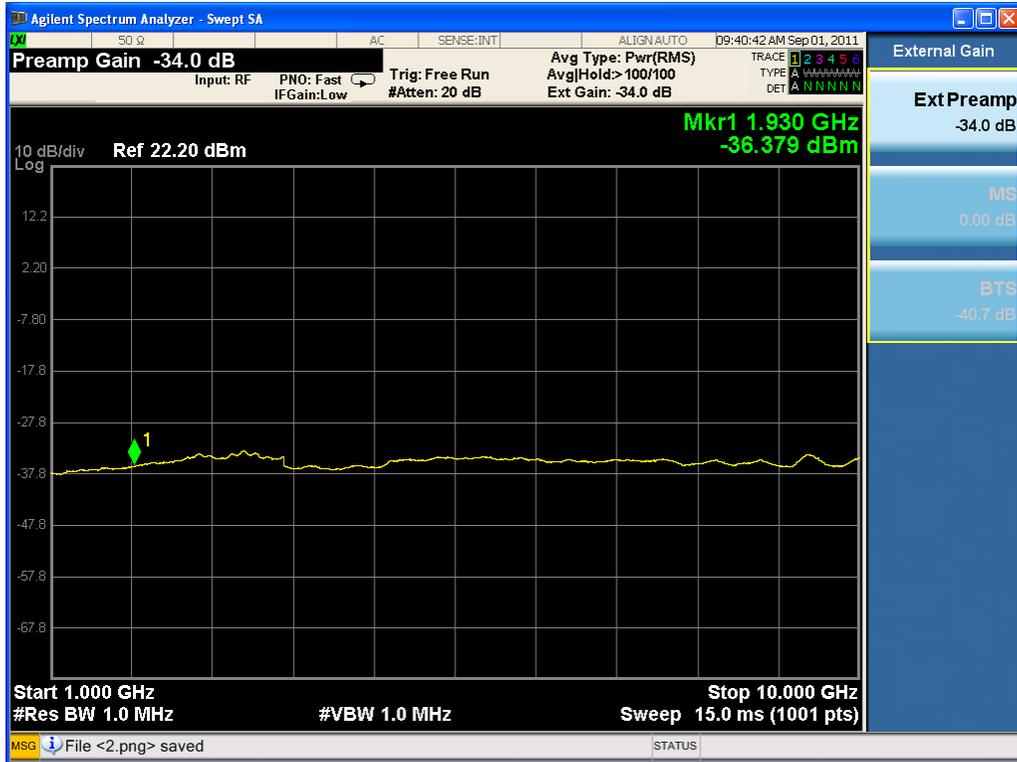
Test Result: Pass

Test Mode: Transmitting CDMA

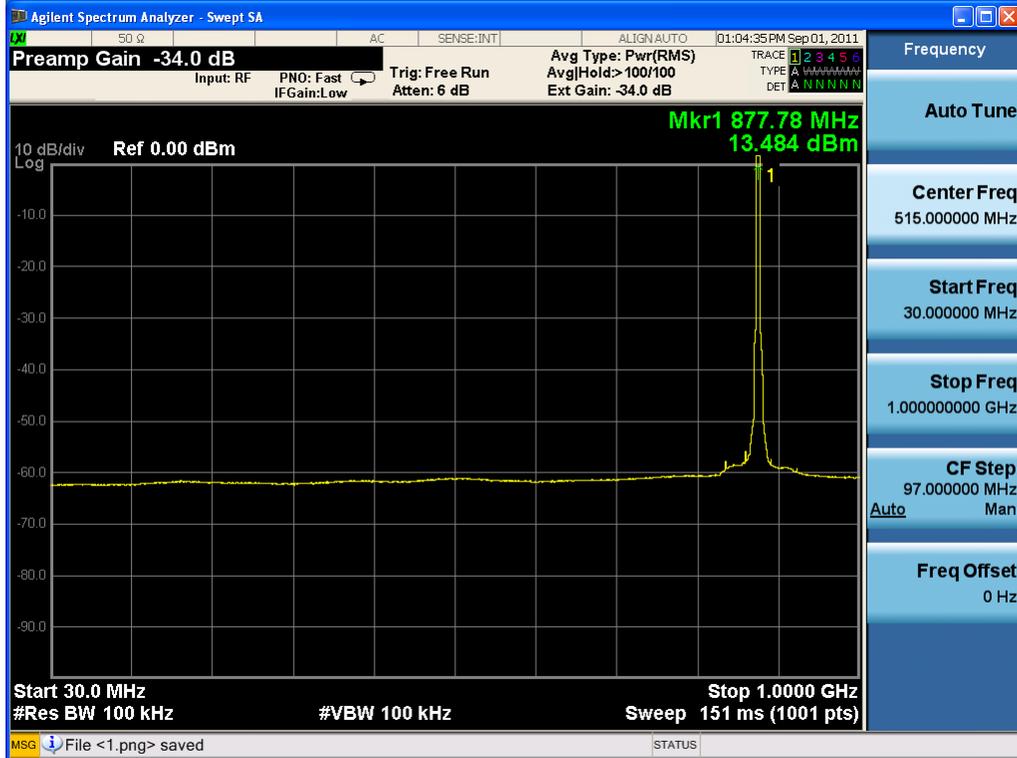
Test Data:

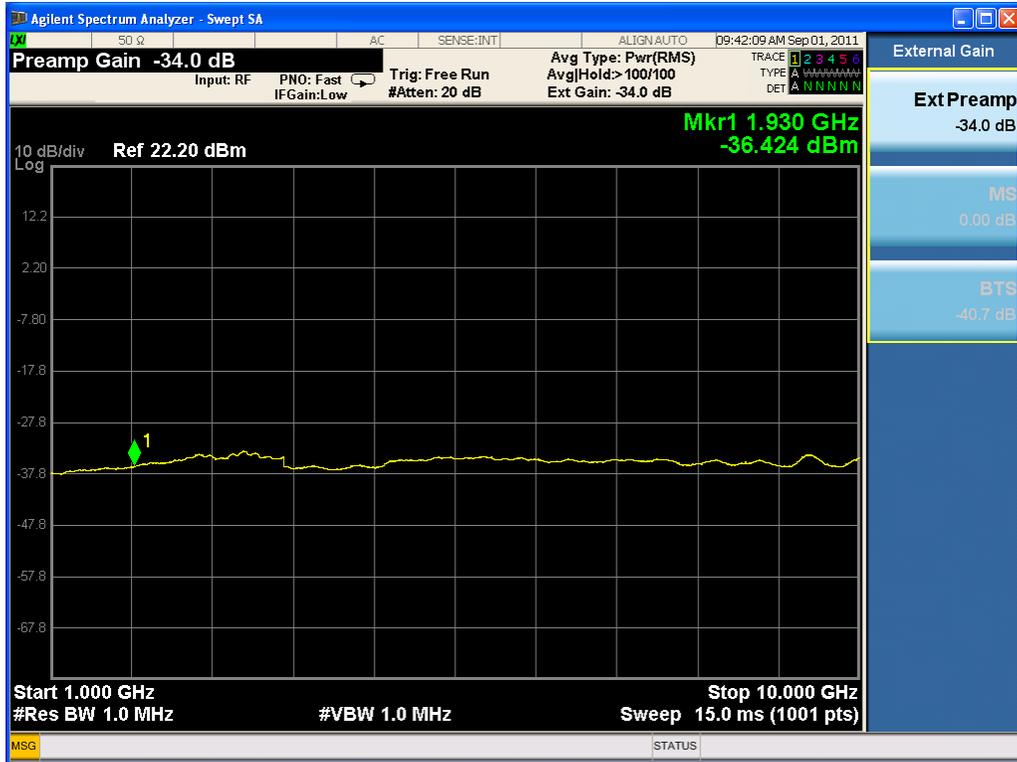
Three carriers (working in bottom frequency)



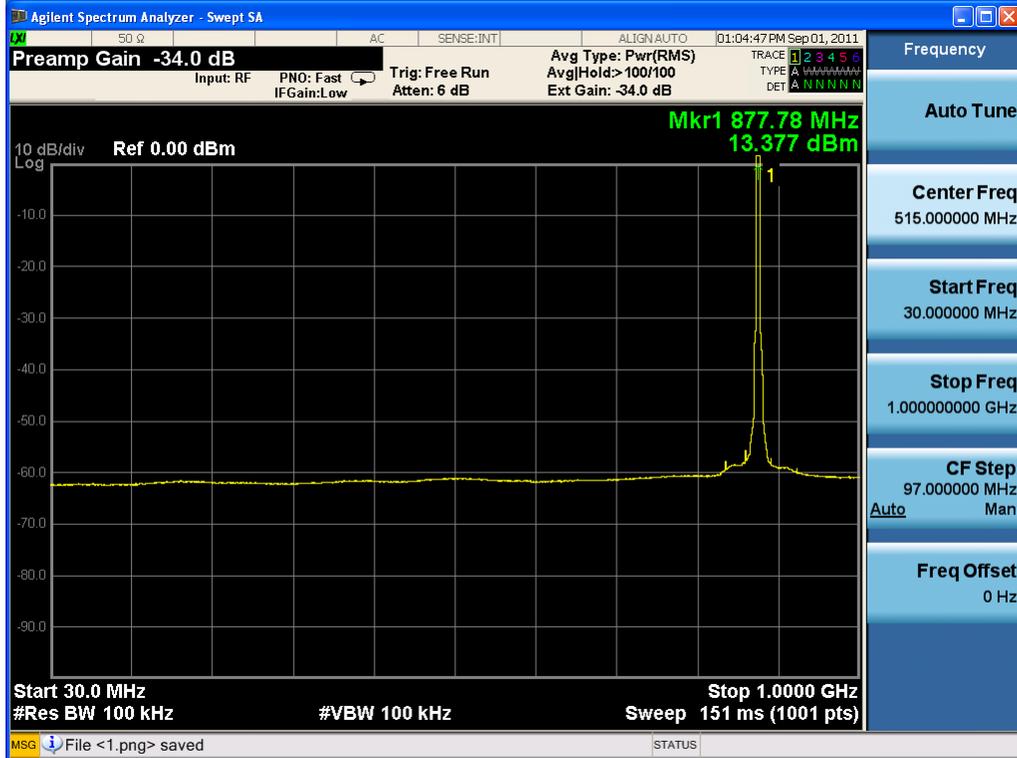


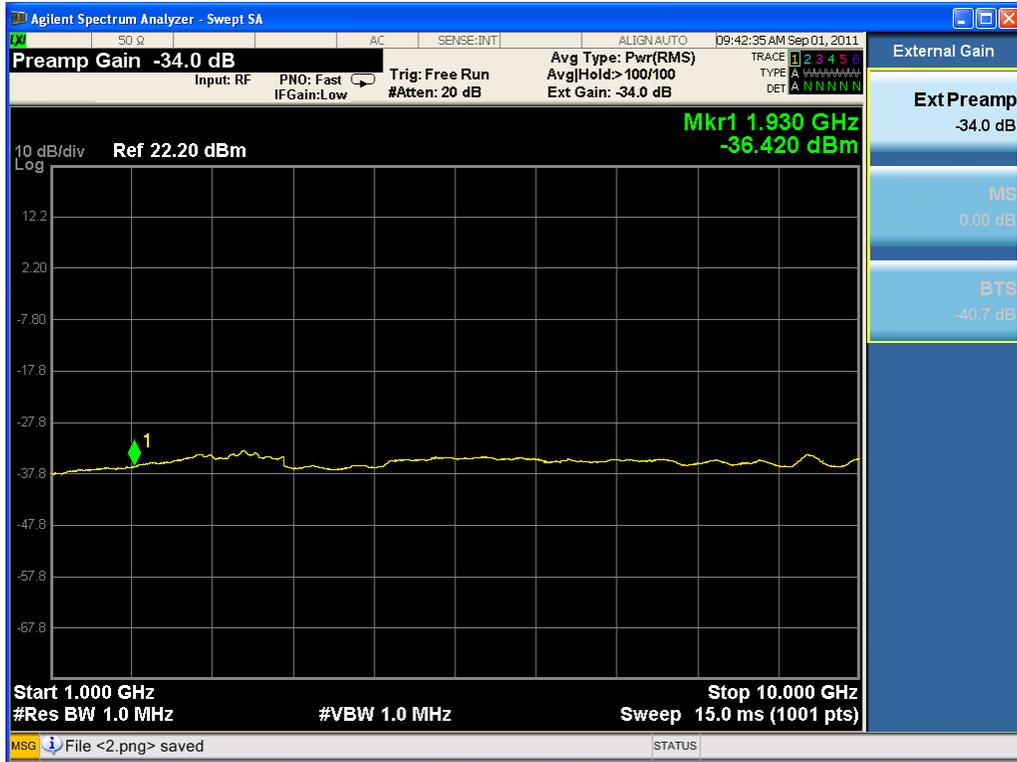
Three carriers (working in middle frequency)



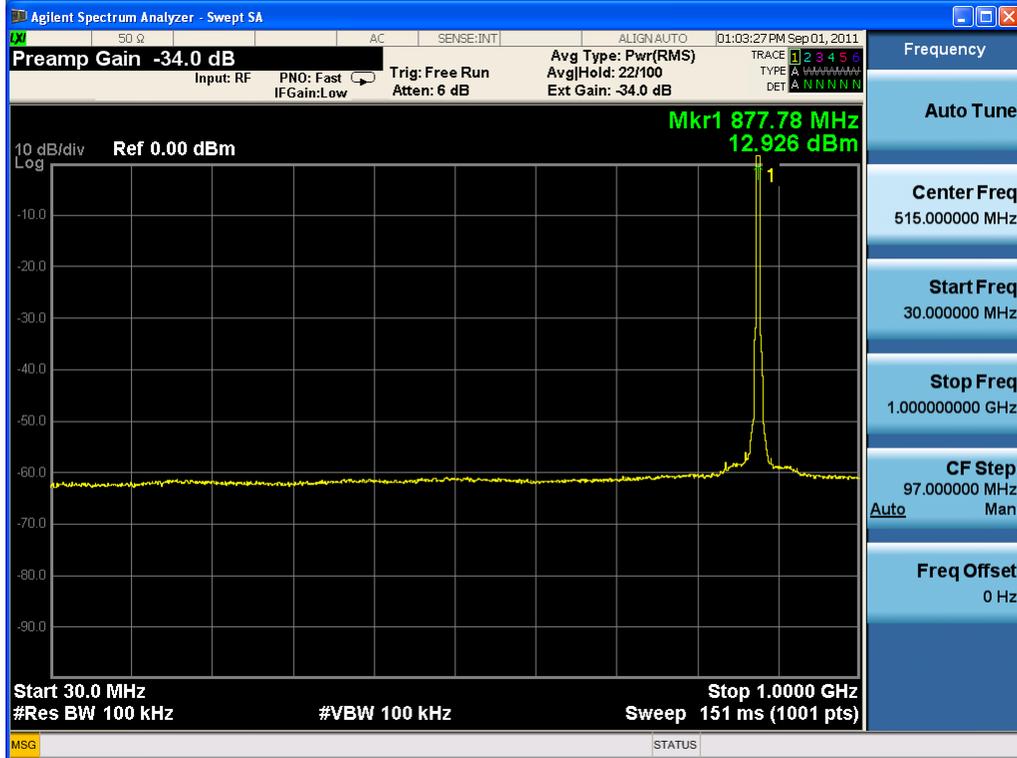


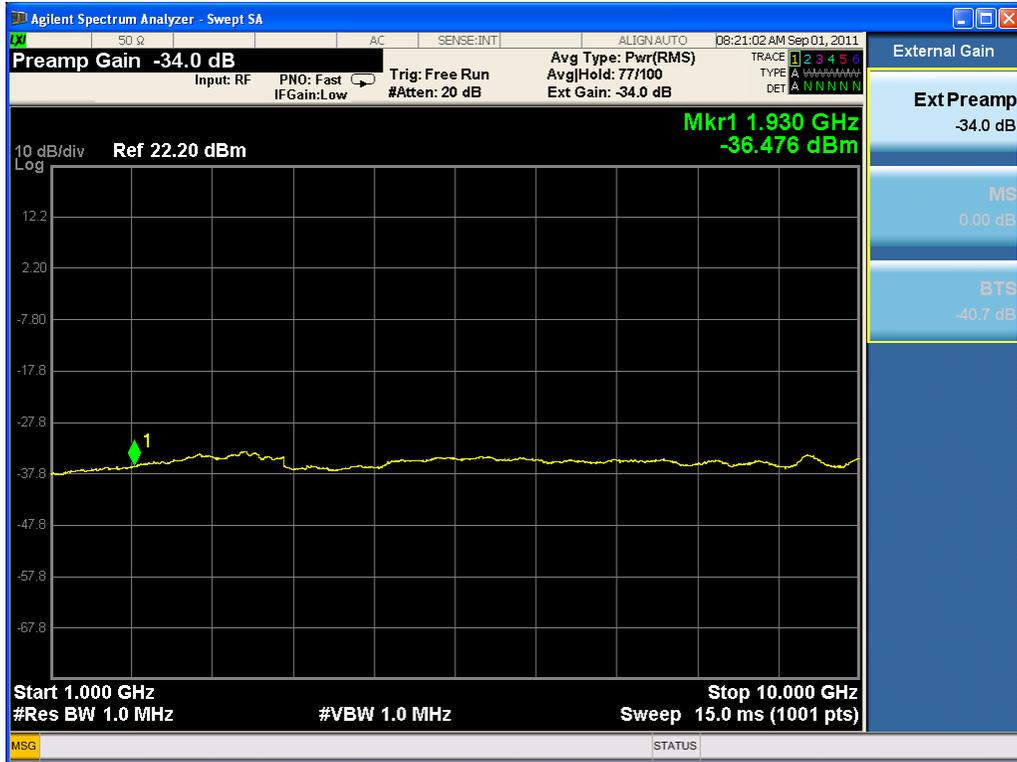
Three carriers (working in top frequency)



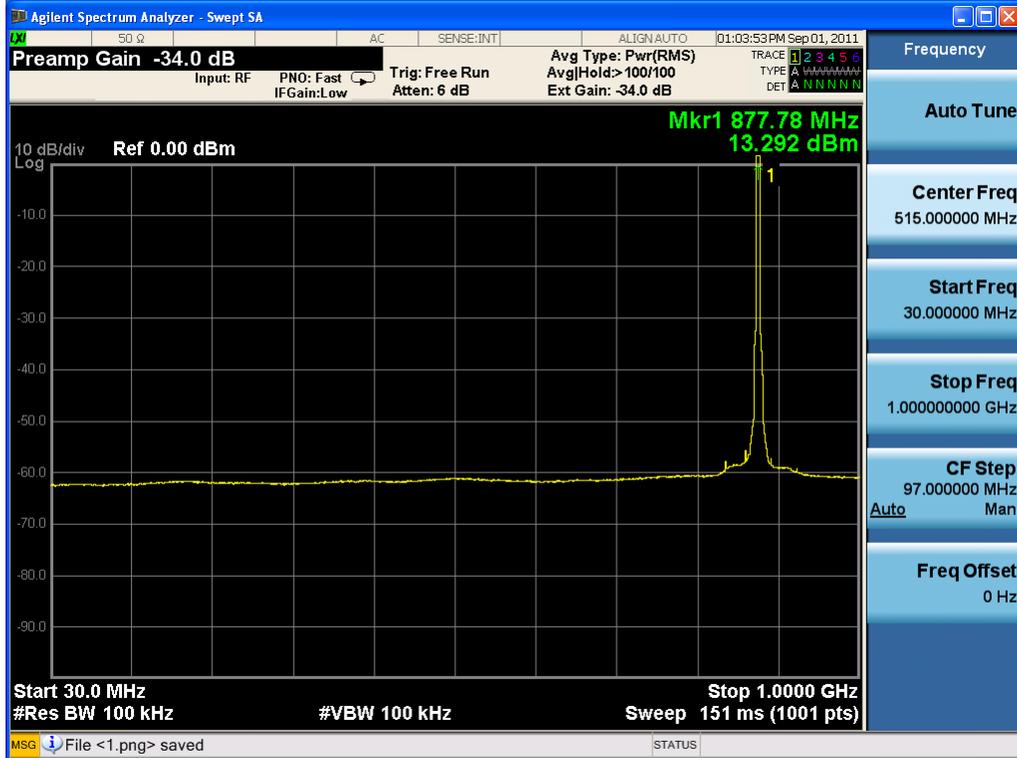


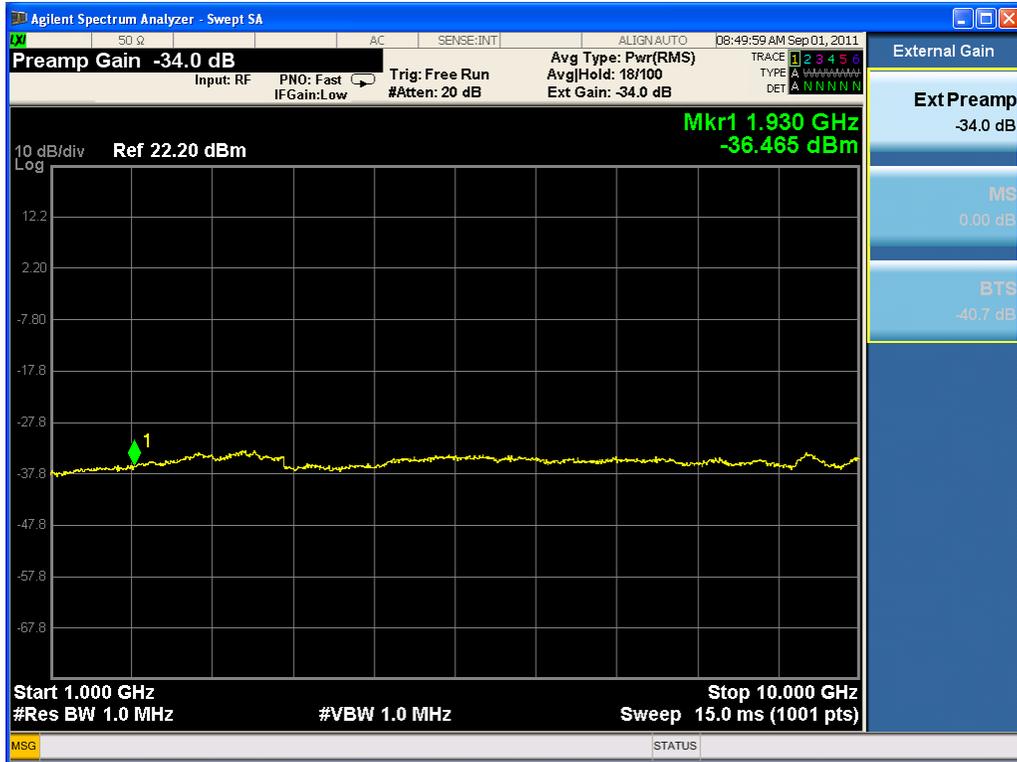
Two carriers (working in bottom frequency)



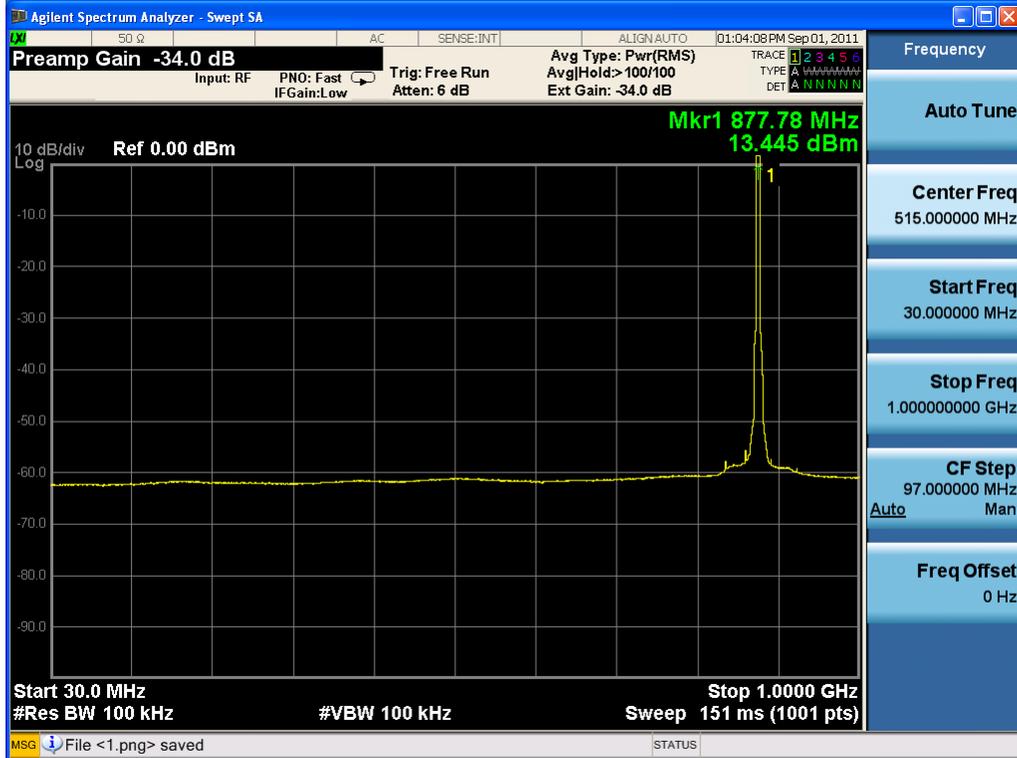


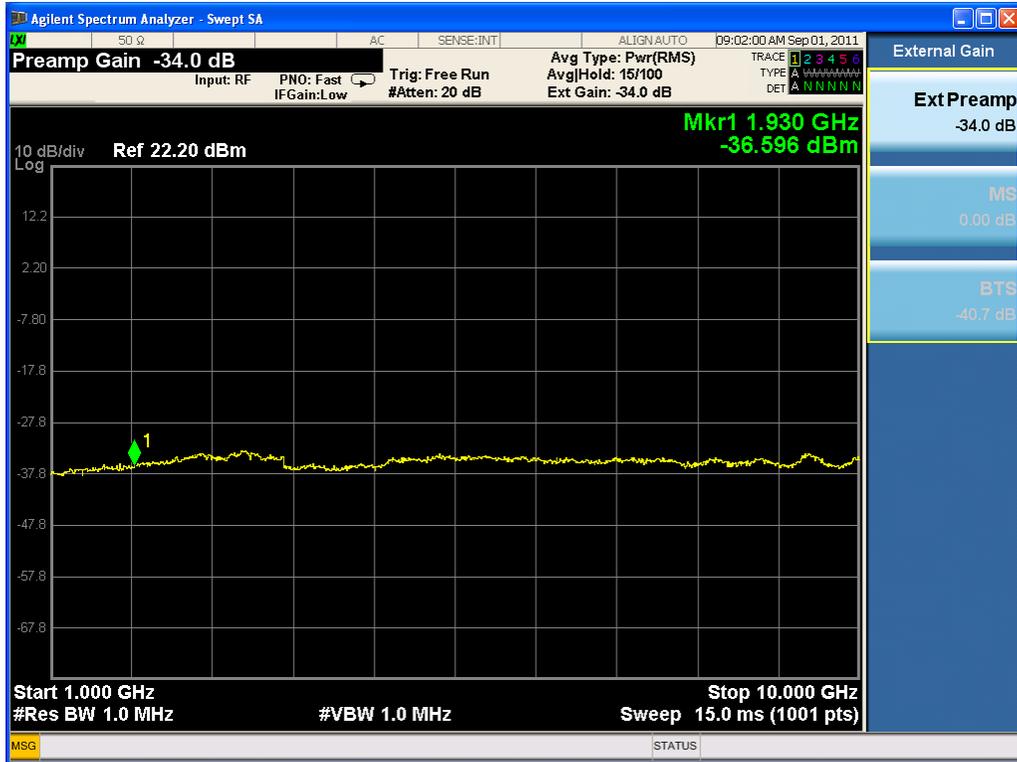
Two carriers (working in middle frequency)



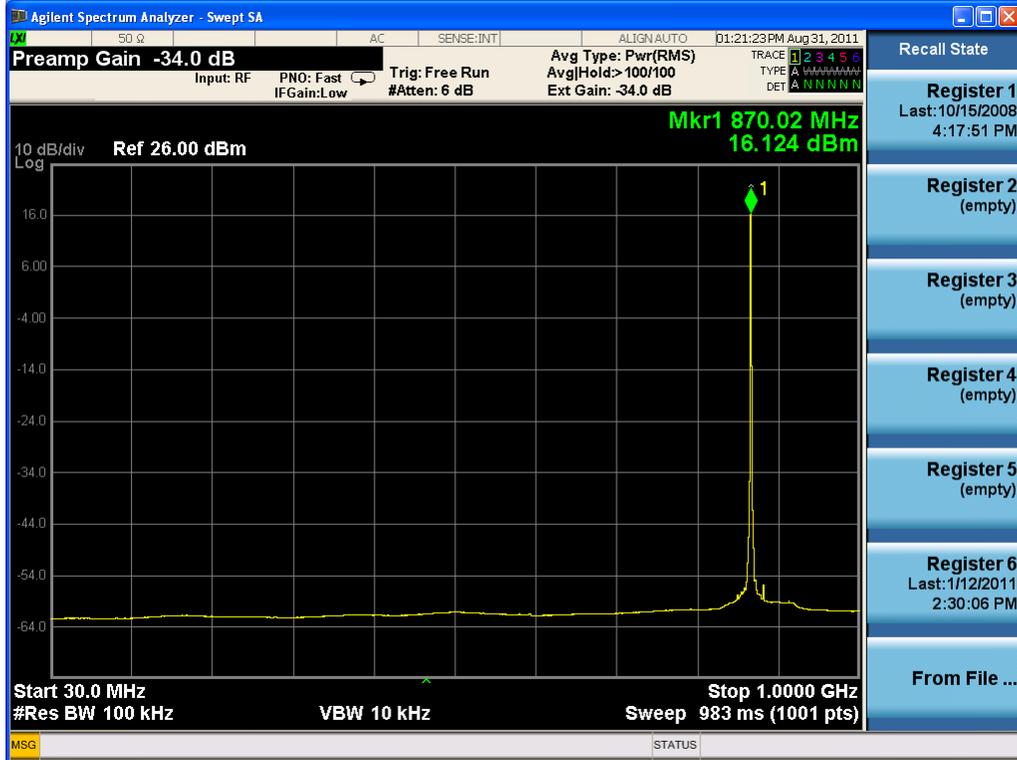


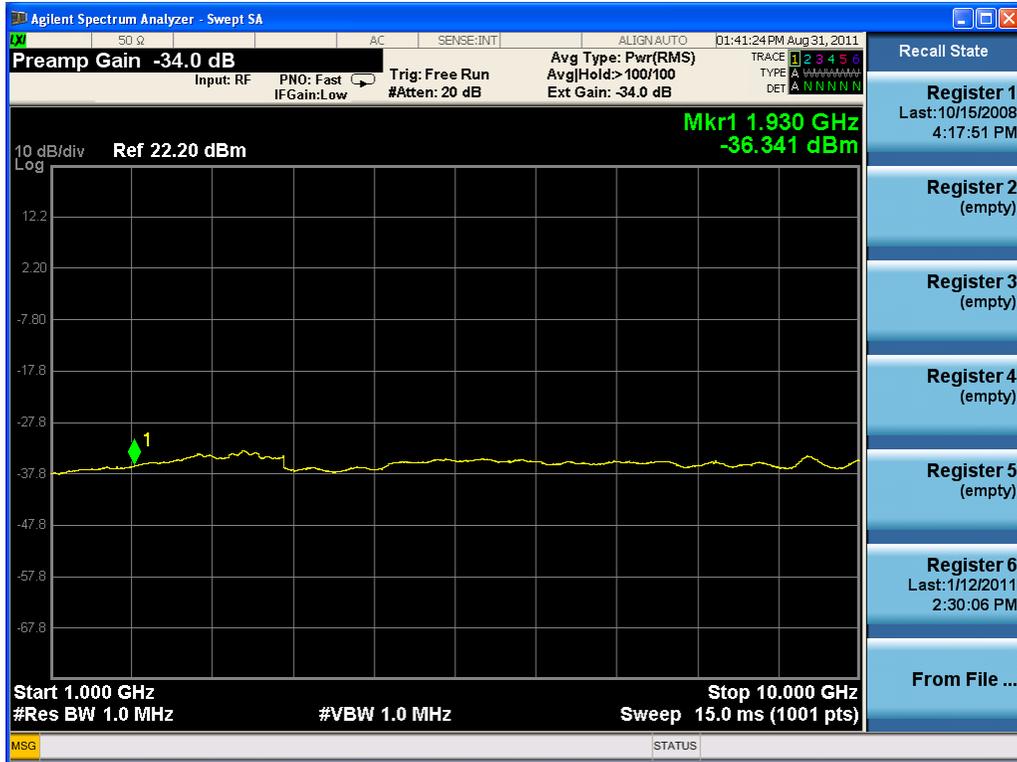
Two carriers (working in top frequency)



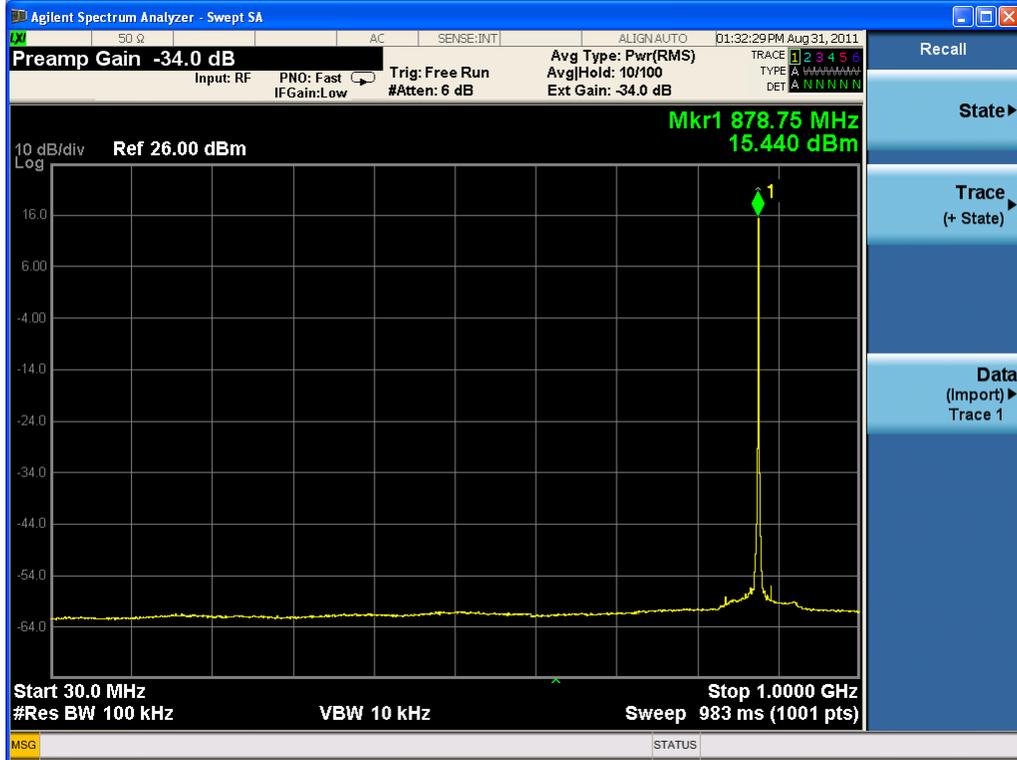


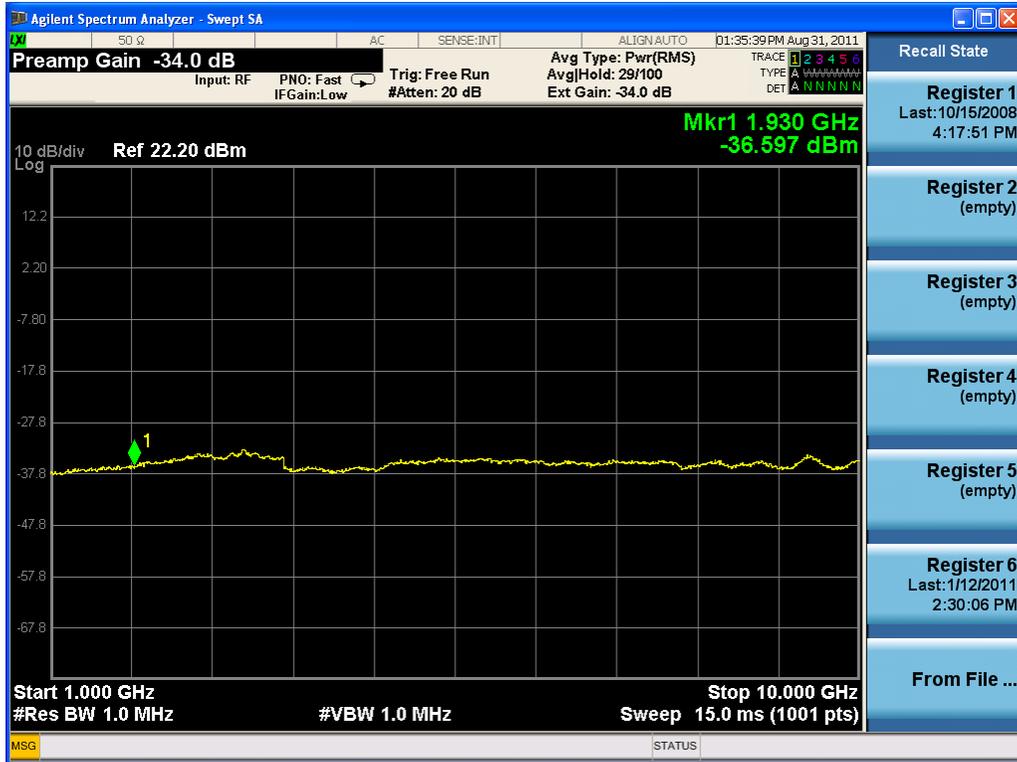
One carrier (working in bottom frequency)



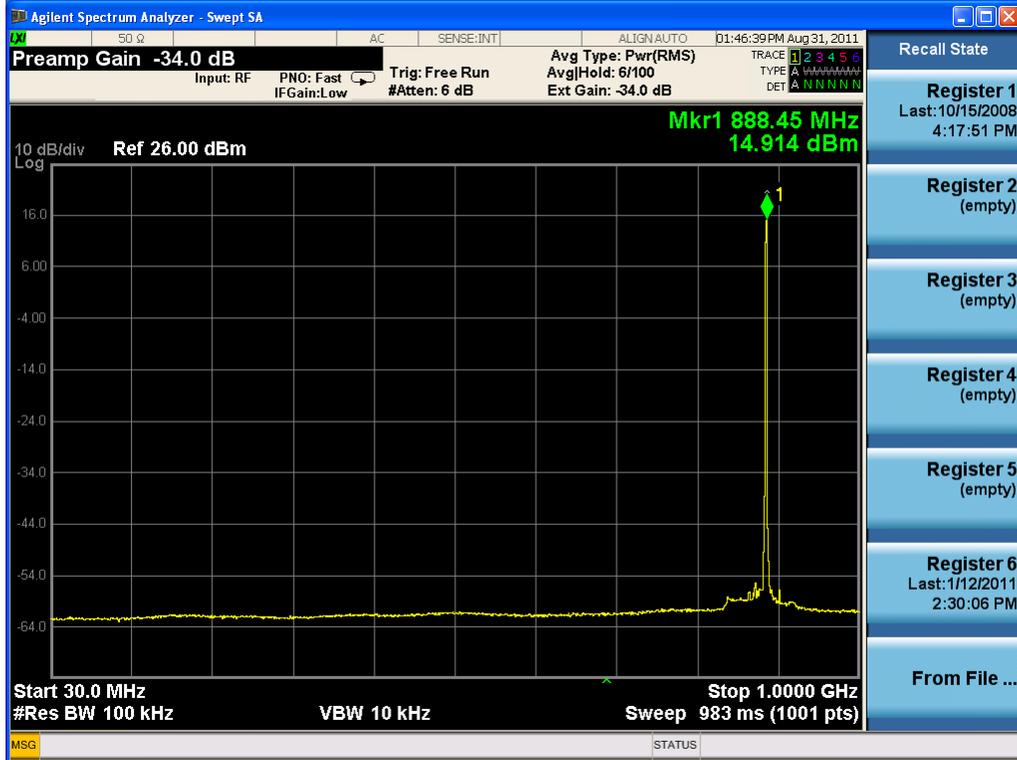


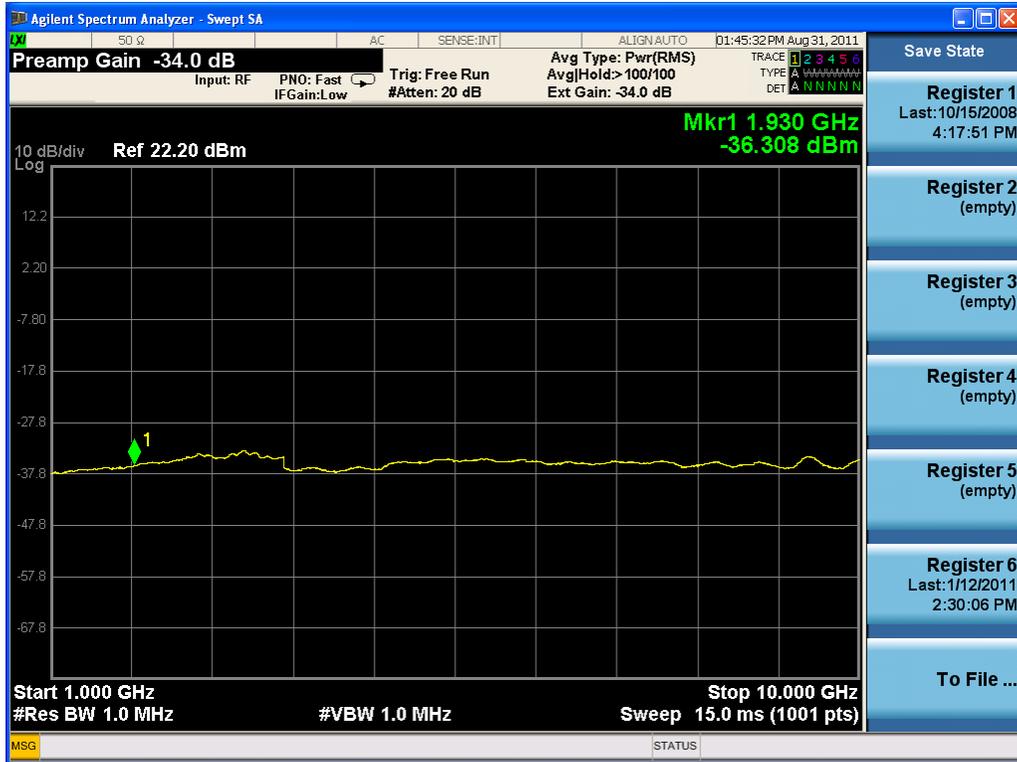
One carrier (working in middle frequency)





One carrier (working in top frequency)





10 OCCUPIED BANDWIDTH

Applicable Standard: FCC §2.1049 §22.917

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2011-4-8	2012-4-7
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	004	1034	2011-4-8	2012-4-7

***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. 99%Power bandwidth was recorded.

Environmental Conditions

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

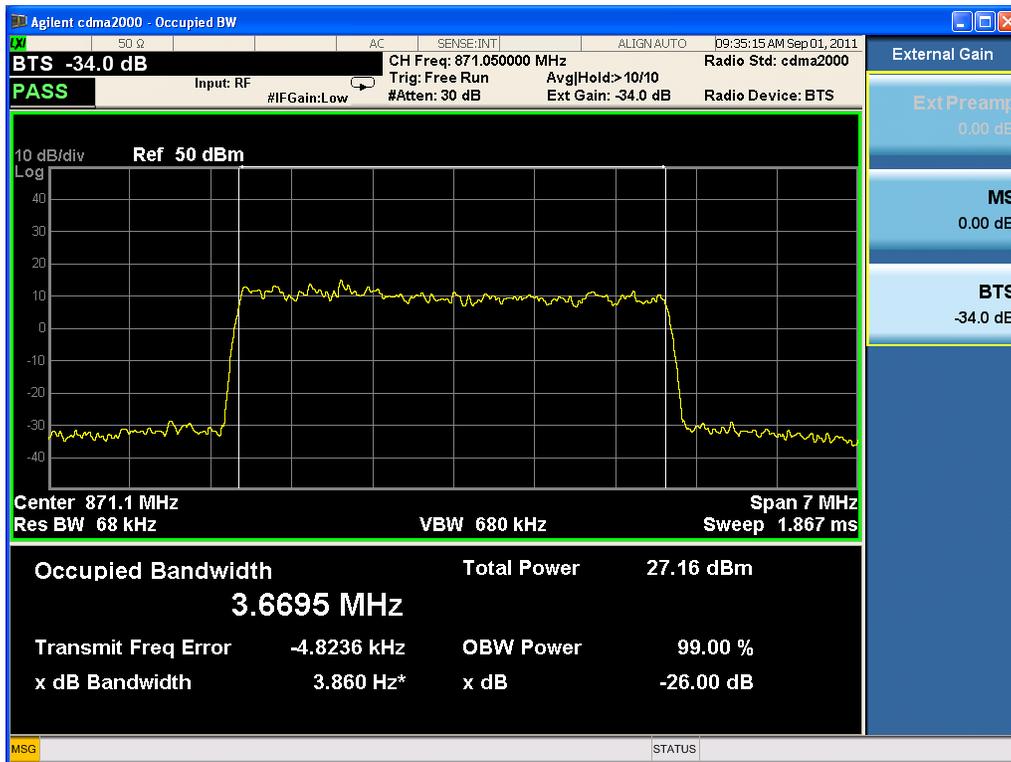
Test Result: Pass

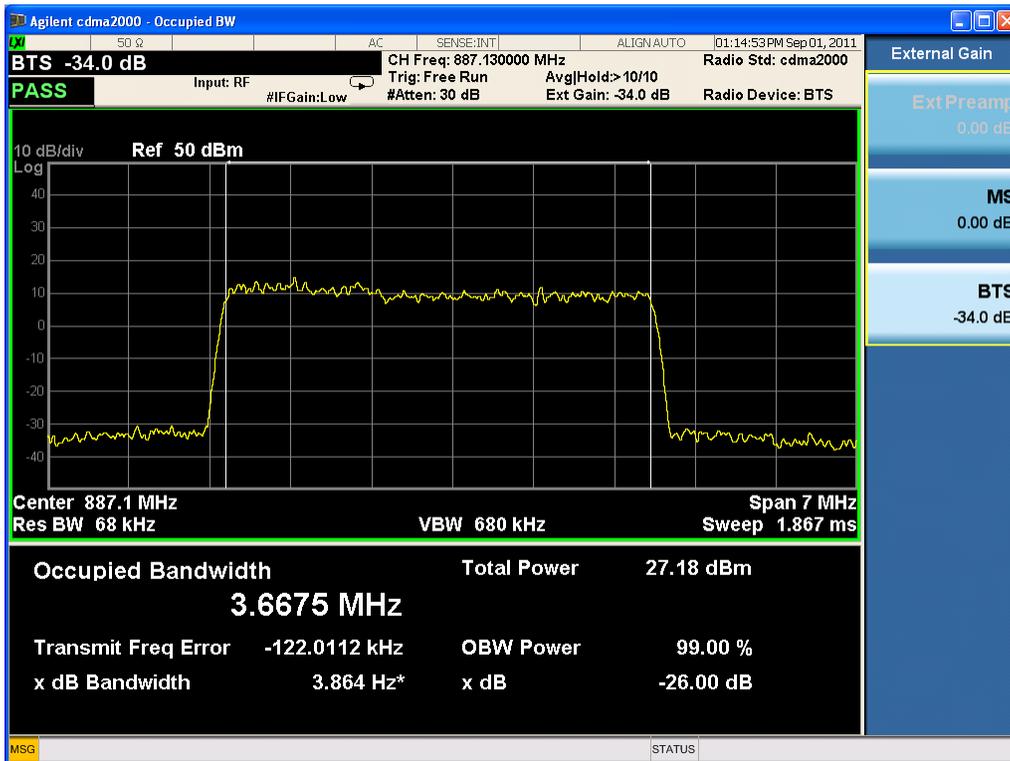
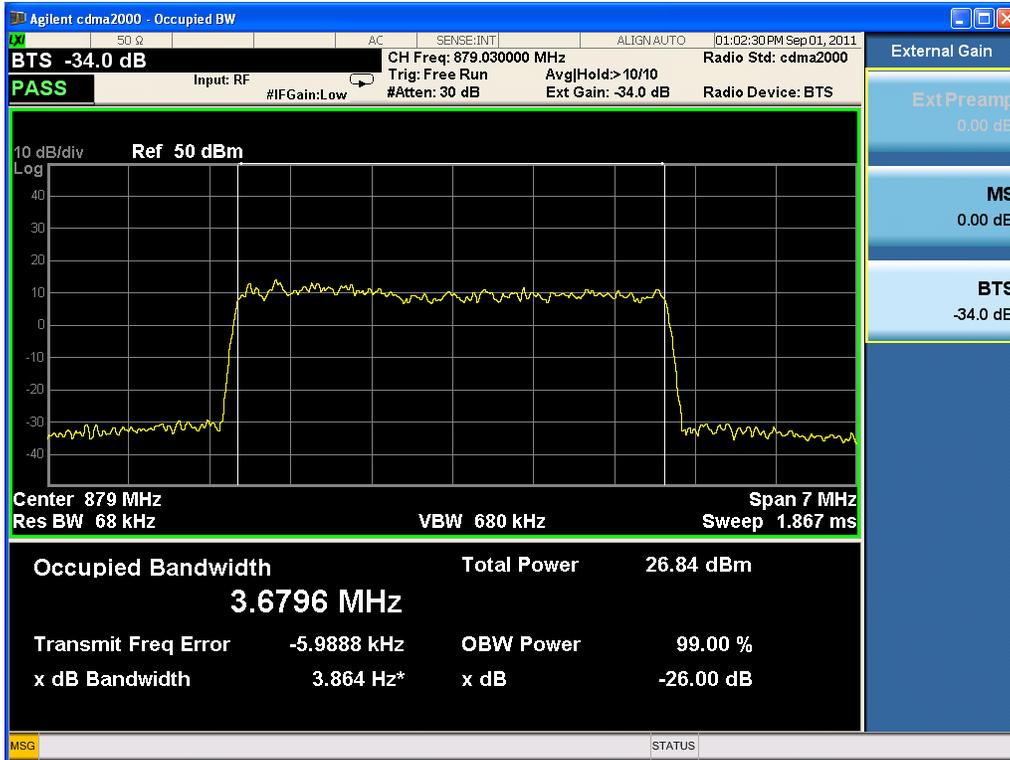
Test Mode: Transmitting CDMA

Test Data

For three carries:

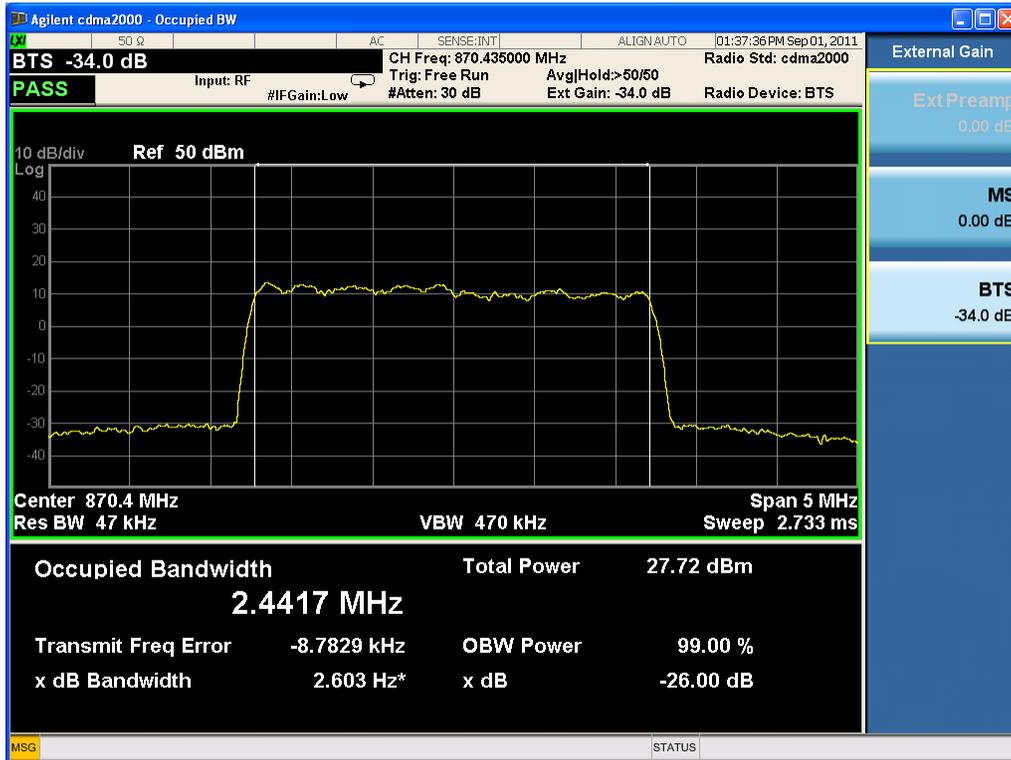
Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
871.05	3.6695	<3.75
879.03	3.6796	<3.75
887.13	3.6675	<3.75

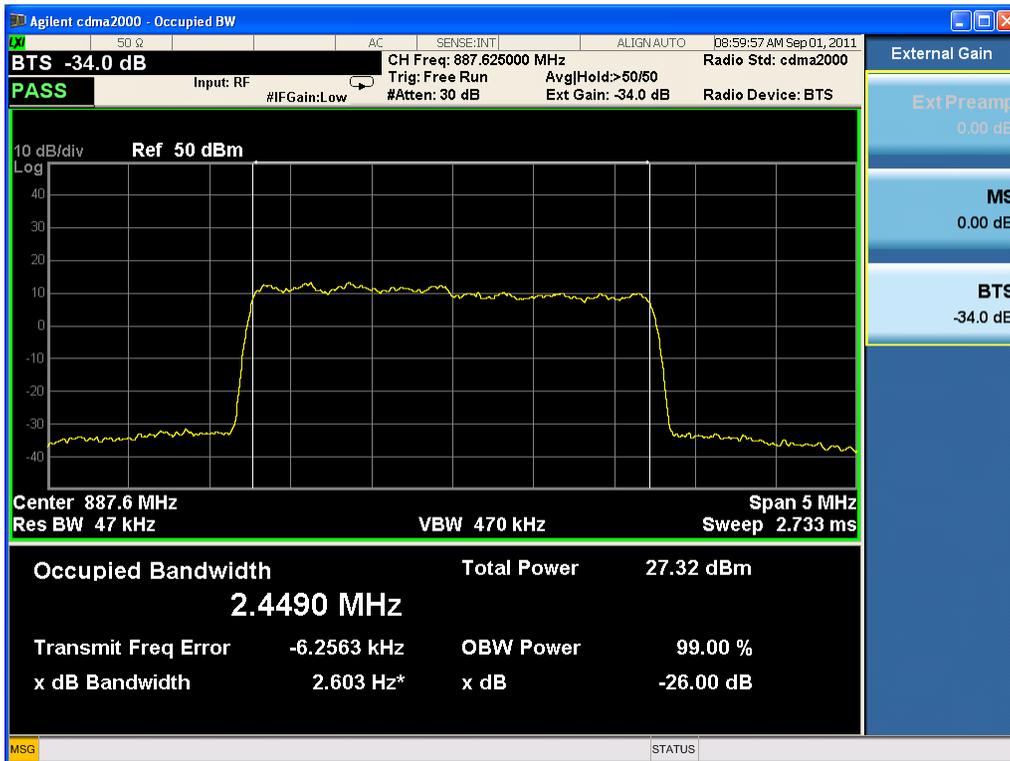
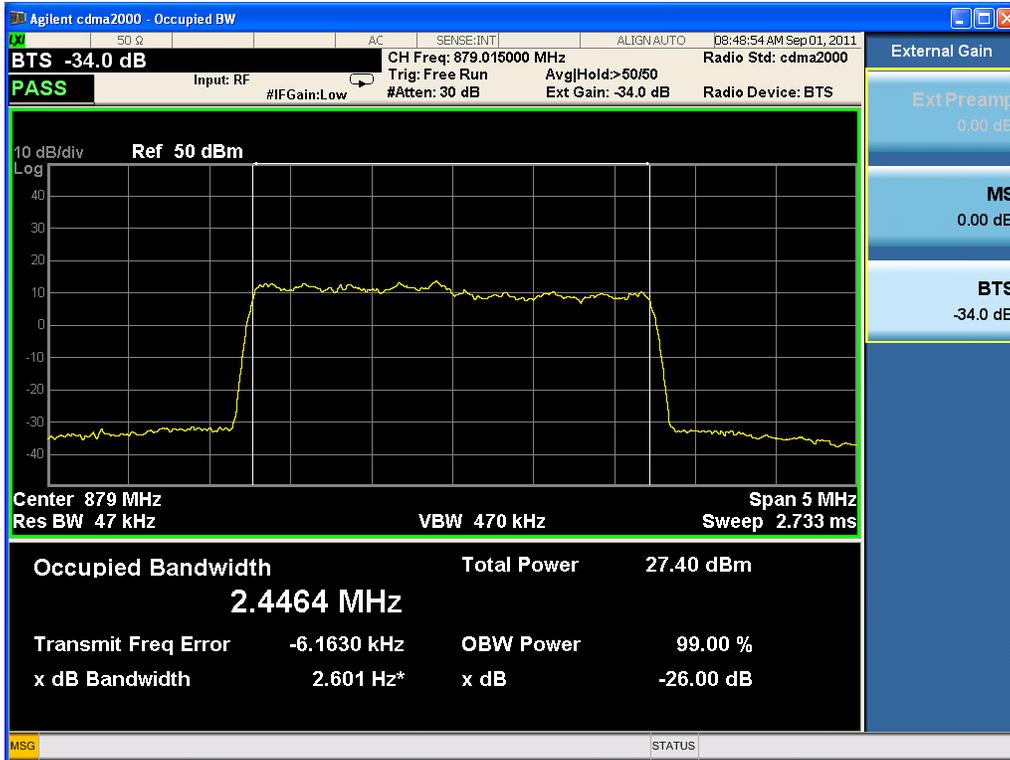




For two carries:

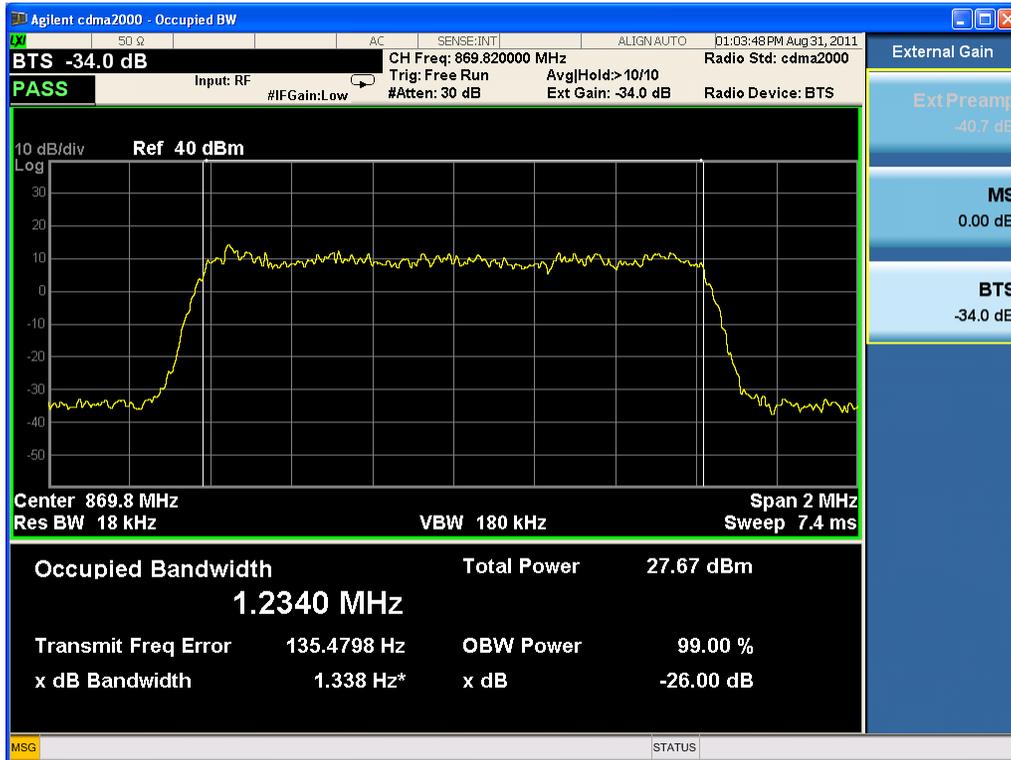
Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
870.435	2.4417	<2.50
879.015	2.4464	<2.50
887.625	2.4490	<2.50

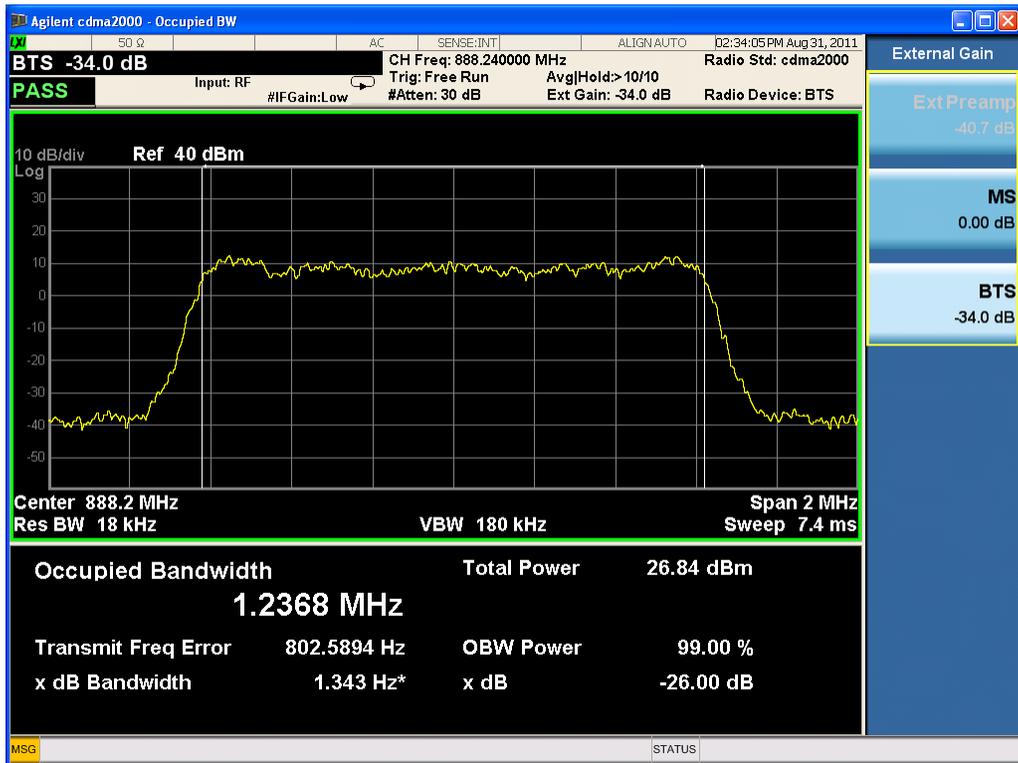
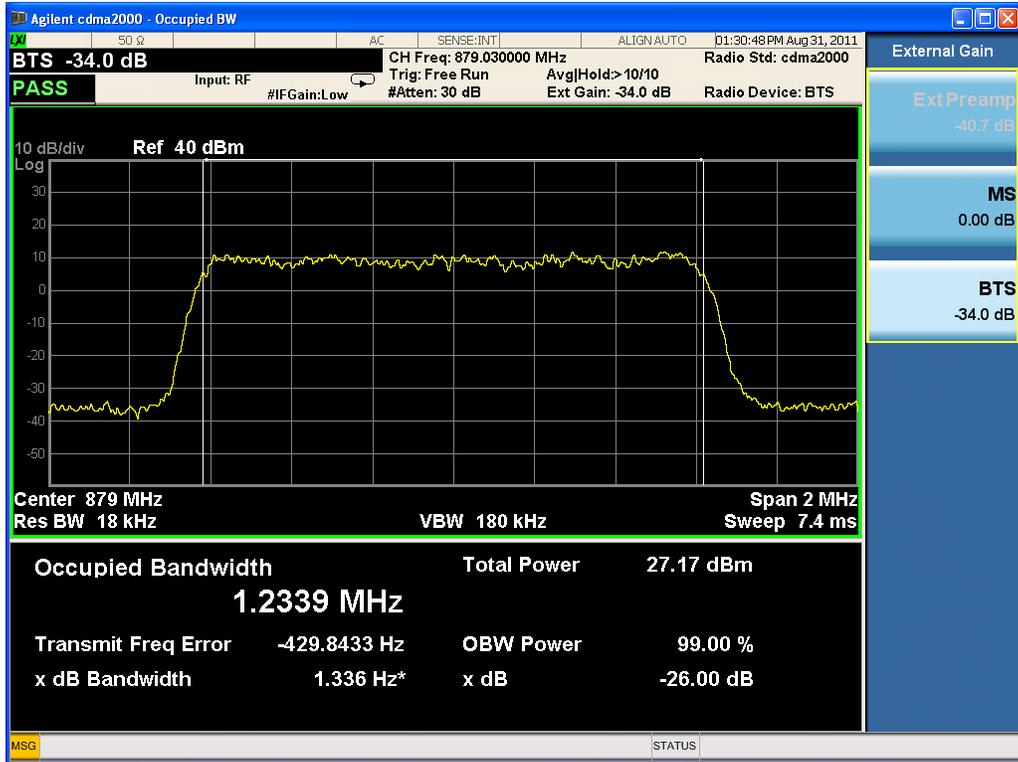




For one carrier

Frequency (MHz)	99% Power Bandwidth (MHz)	Limit (MHz)
869.82	1.2340	<1.25
879.03	1.2339	<1.25
888.24	1.2368	<1.25





11 BAND EDGES

Applicable Standard: FCC §2.1051

According to §2.1051, 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	2011-4-8	2012-4-7
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	004	1034	2011-4-8	2012-4-7

***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

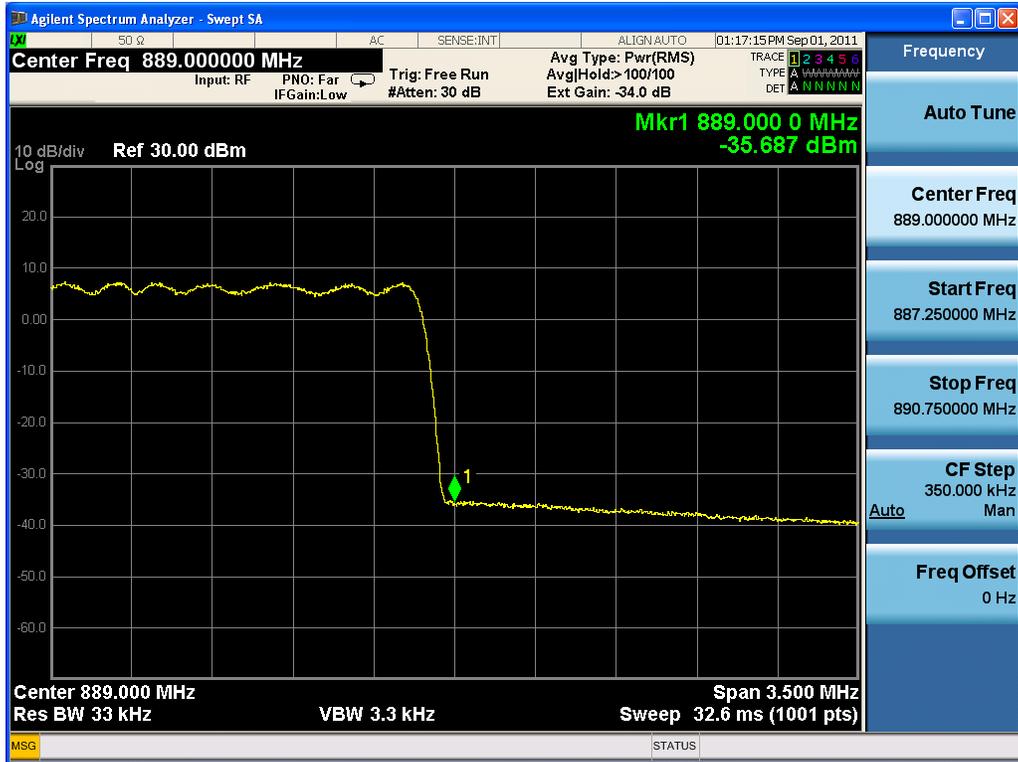
Test Mode: Transmitting CDMA

Test Data

three carriers

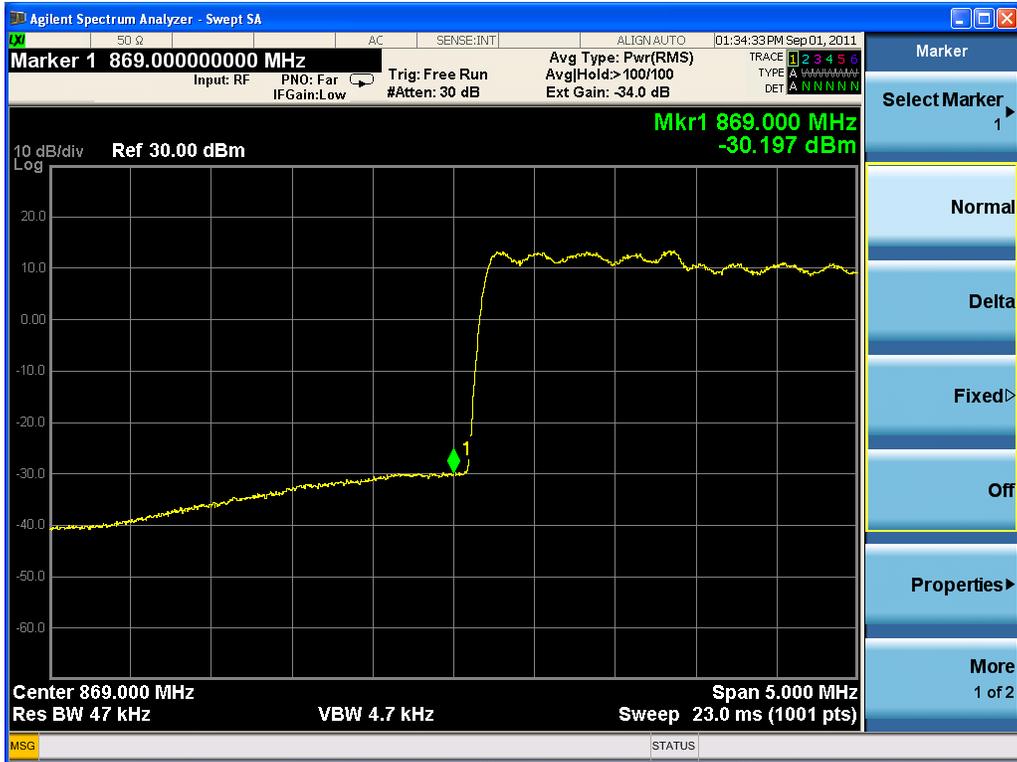
Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
869.82/871.05/872.28	-31.173	-13.00
885.78/887.01/888.24	-35.687	-13.00





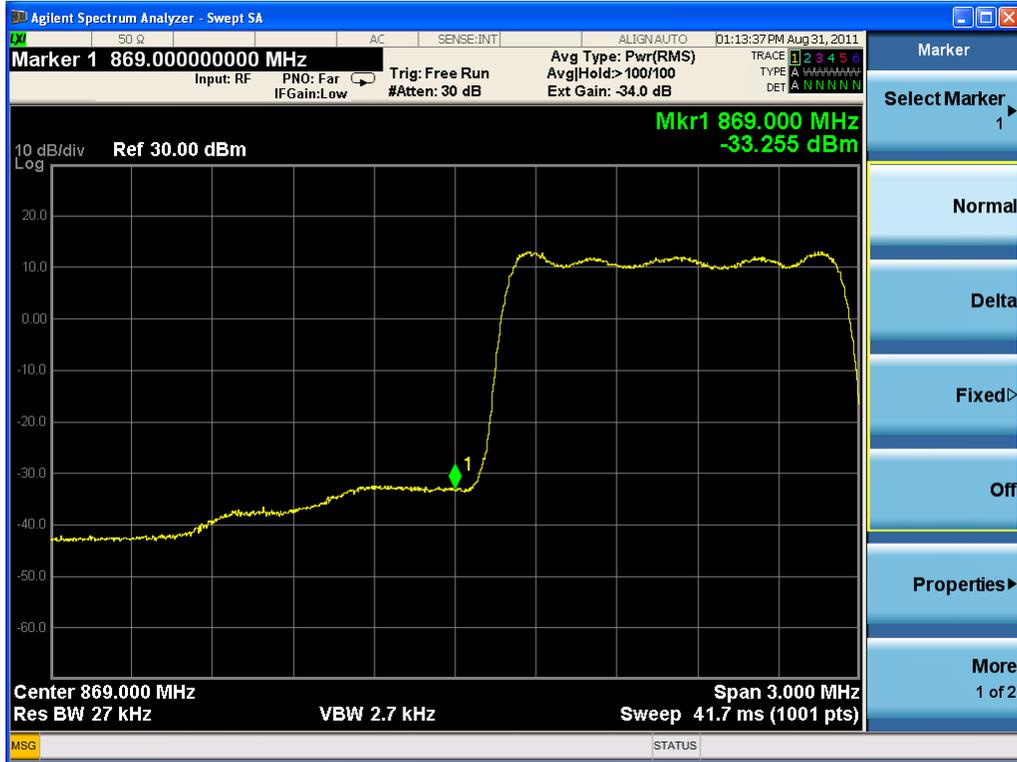
two carriers

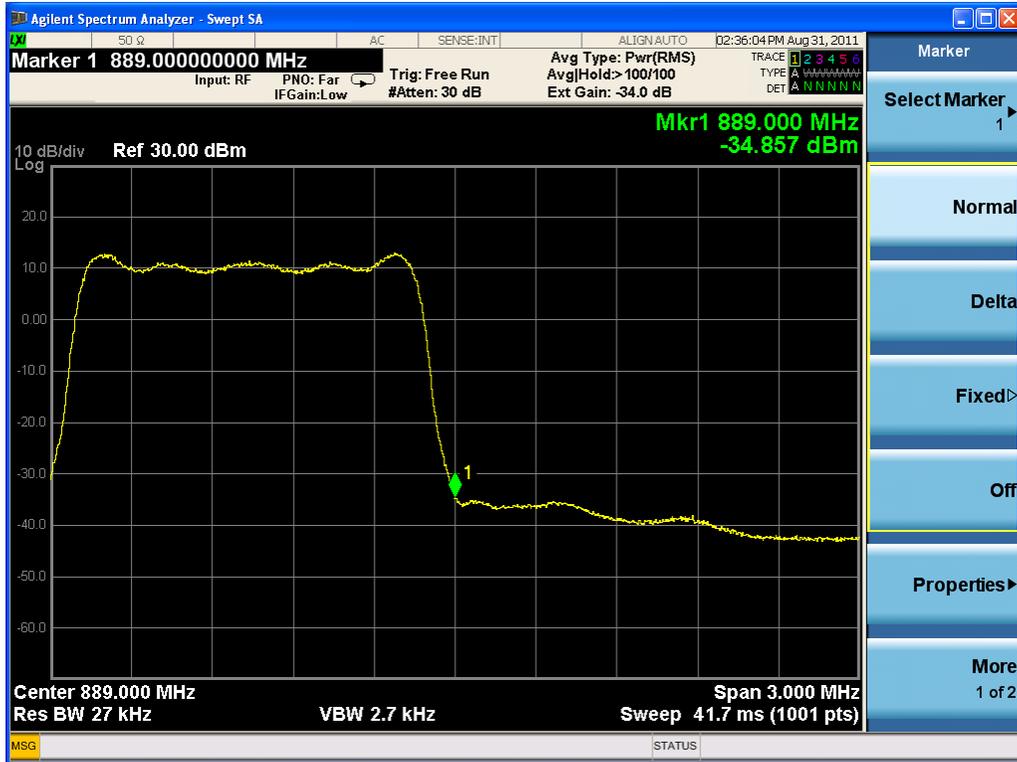
Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
869.82 /871.05	-30.197	-13.00
887.01/ 888.24	-33.466	-13.00



One carrier

Frequency channel	Max bandedge Emission (dBm)	Limit (dBm)
869.82	-33.255	-13.00
888.24	-34.857	-13.00





12 FREQUENCY STABILITY

Applicable Standard: FCC § 2.1055, § 22.355

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	2011-1-26	2012-1-26
Agilent	MXA Series Spectrum Analyzer	N9020A	MY48011941	2011-4-8	2012-4-7
Atten	30dB Attenuator	ATSI150-4-30	11300110201221	2011-7-11	2012-7-11
Forstar	Forstar RF Cable	004	1034	2011-4-8	2012-4-7

***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 (V _{AC})	Frequency Measure Error (Hz)	Error (ppm)	Limit (ppm)	Result
f=879.03MHz					
-20	110	-12.6	-0.014	1.5	PASS
-10	110	-12.6	-0.014	1.5	PASS
0	110	-11.8	-0.013	1.5	PASS
10	110	-12.2	-0.014	1.5	PASS
20	110	-12.2	-0.014	1.5	PASS
30	110	-12.8	-0.015	1.5	PASS
40	110	-12.8	-0.015	1.5	PASS
45	110	-12.6	-0.014	1.5	PASS

Frequency Stability Versus Voltage

Frequency Stability vs. Voltage					
Voltage $V_{AC}/60\text{Hz}$	Temperature $^{\circ}\text{C}$	Frequency Measure Error Hz	Error ppm	Limit ppm	Result
$f=879.03\text{MHz}$					
90	20	-12.2	-0.014	1.5	PASS
264	20	-12.4	-0.014	1.5	PASS