



47 CFR PART 22H

TEST REPORT

of

CDMA 1X Digital Mobile Phone

Trade Name: ZTE
Brand Name: ZTE
Model Name: ZTE-C X991
Report No.: SZ10110077E01
FCC ID.: Q78-CX991

prepared for

ZTE Corporation

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China

prepared by
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CTIA Authorized Test Lab

LAB CODE 20081223-00

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Change History		
Issue	Date	Reason for change
1.0	November 23, 2010	First edition
2.0	November 29, 2010	Second edition

1. Test Result Certification

Equipment under Test: CDMA 1X Digital Mobile Phone

Trade Name: ZTE

Brand Name: ZTE

Model Name: ZTE-C X991

FCC ID: Q78-CX991

Applicant: ZTE Corporation

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Manufacturer: ZTE Corporation

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Test Standards: 47 CFR Part 2

47 CFR Part 22 Subpart H

Test Date(s): November 10, 2010 – November 29, 2010

Test Result: PASS

* We Hereby Certify That:

The equipment under test was tested by Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related FCC rules.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by: Tian Junjie Dated: 2010.11.29
Tian Junjie

Reviewed by: Ni Yong Dated: 2010.11.29
Ni Yong

Approved by: Shu Luan Dated: 2010.11.29
Shu Luan



The seal is a blue octagonal stamp. The outer ring contains the text 'Products Quality Certification' at the top, 'Services Certification' at the bottom, and 'GLOBAL SERVICE' at the bottom. The inner ring contains 'MORLAB' at the top and 'Certification' at the bottom.

2. General Information

2.1 Equipment under Test (EUT) Description

Description	CDMA 1X Digital Mobile Phone
Model Name	ZTE-C X991
Serial No.....	N/A
Hardware Version	X991MB_B
Software Version.....	x991ve_v1.2
Emission Designator.....	1M25F9W
Modulation	CDMA 1X
Frequency	Tx: 824.7 – 848.31 MHz; Rx: 869.7-893.31MHz
Power Supply:	Battery
	Brand name: ZTE
	Model Name: Li3709T42P3h504047
	Capacitance: 900mAh
	Rated voltage: 3.7V
	Charge limited: 4.2V
	Manufacturer: ZTE
	Manufacturer Address: ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park,Nanshan District,Shenzhen,Guangdong,P.R.China
Accessory Equipment:.....	AC Adapter (Charger for Battery)
	Brand Name: Ruide
	Model Name: STC-A22O50U5-C
	Rated Input: 100-240V~ 50/60Hz 200mA
	Rated Output: 5V= 700mA
	Manufacturer: Ruide Electronical Industrial Co., Ltd,

NOTE:

1. The EUT is a model of CDMA 1X mobile station operating in Cellular band.
2. The normal configuration for the EUT is the Mobile Phone (MS) associated with ancillary equipments e.g. the Battery and/or the AC Adapter (Charger).
3. For detailed features about the EUT, please see user manual supplied by the applicant.

2.2 Test Standards and Results

The objective of the report is to perform tests according to 47 CFR Part 2, Part 22 for FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 2 (10-1-09Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
3	47 CFR Part 22 (10-1-09 Edition)	Public Mobile Services

Test detailed items and the results are as below:

No.	Rules	Test Type	Result
FCC Part 22 Requirement			
1	§2.1046	Conducted RF Output Power at Antenna Terminal	PASS
2	§2.1049	Occupied Bandwidth	PASS
3	§2.1051 §2.1057 §22.917	Conducted Spurious Emission at Antenna Terminal	PASS
4	§22.913	Transmitter Radiated Power (ERP)	PASS
5	§2.1053 §2.1057 §22.917	Radiated Spurious Emission	PASS
6	§2.1055 §22.355	Frequency Stability	PASS

NOTE: Measurement method according to TIA/EIA-603

2.3 Facilities and Accreditations

2.3.1 Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. The site was constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22, the FCC registration number is 741109.

2.3.2 Test Equipments

No.	Description	Specification
1	System Simulator	Manufacturer: Agilent Model No.: E5515C Serial No.: GB43130131
2	Spectrum Analyzer	Manufacturer: Agilent Model No.: E7405A Serial No.: US44210471
3	Telecommunication Antenna	Manufacturer: European Antennas Model No.: PSA-45010R/356 Serial No.: 403688-001
4	Trilogy Antenna	Manufacturer: Schwarzbeck Model No.: VULB 9163 Serial No.: 9163-274
5	Horn Antenna	Manufacturer: Schwarzbeck Model No.: BBHA 9120C Serial No.: 9120C-384
6	Power Splitter	Manufacturer: WEINSCHEL Model No.: 1506A Serial No.: NW521
7	Anechoic Chamber	Manufacturer: Albatross Projects GmbH
8	DC Power Supply	Manufacturer: Good Will Instrument Co., Ltd.
9	Temperature Chamber	Manufacturer: Chongqing YinHe Experimental Equip. Co., Ltd.

NOTE:

- Equipments listed above have been calibrated and are in the period of validation.

2.3.3 Test Environment Conditions

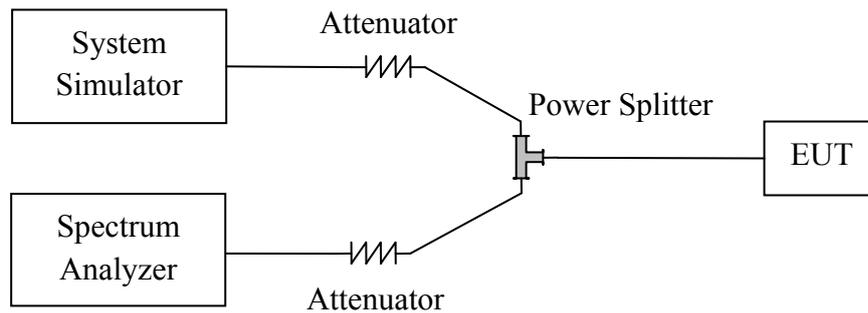
During the measurement, the environmental conditions were within the listed ranges:

Temperature:	20 - 25°C
Relative Humidity:	40 - 60%
Atmospheric Pressure:	86-106kPa

3. 47 CFR Part 2, Part 22H Requirements

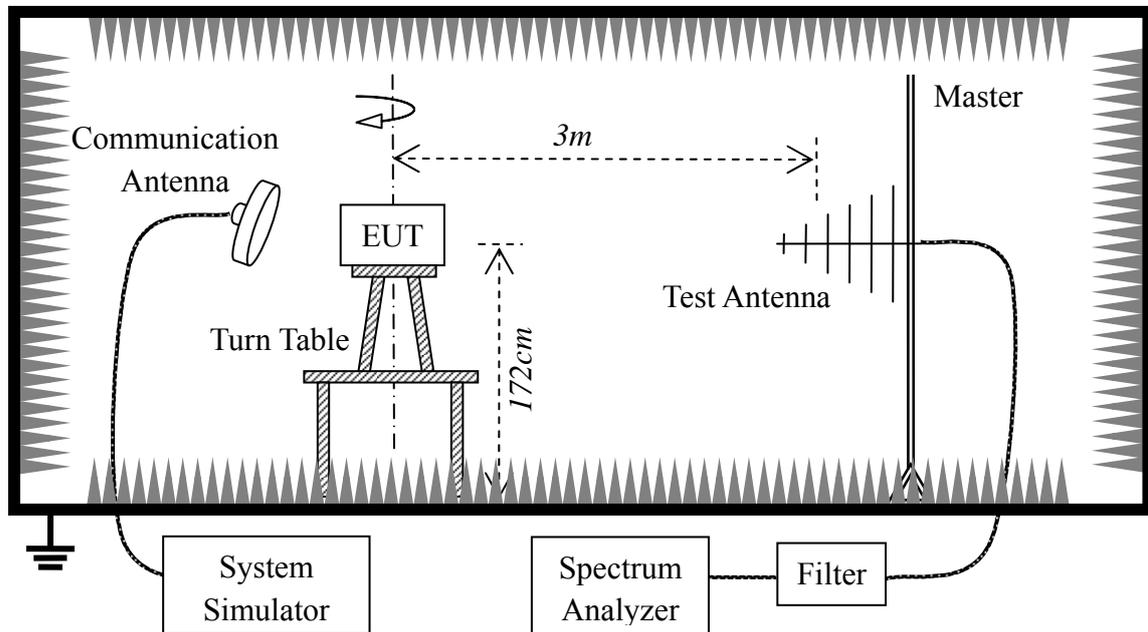
3.1 General Information

3.1.1 Conducted Related Tests



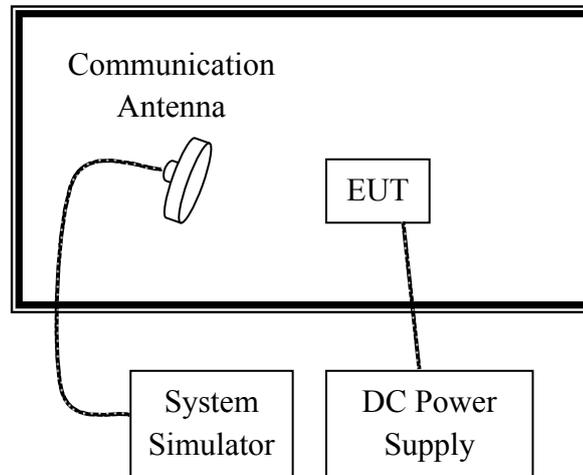
1. The EUT is coupled to the Spectrum Analyzer and the System Simulator with the suitable Attenuators through the Power Splitter; the path loss is calibrated to correct the reading.
2. The EUT is configured here as MS + Battery.
3. The EUT is commanded via the System Simulator (SS) to operate at the maximum output power .A communication link is established between the EUT and the SS.
4. The Spectrum Analyzer is set to max-peak detector function and maximum hold mode.

3.1.2 Radiated Power and Spurious Emission Tests



1. The test is performed in a full-Anechoic Chamber; the air loss of the site and the factors of the test system are pre-calibrated using the substitution method.
2. The EUT is configured as MS + Battery.
3. The EUT is placed on the vertical axis of a Turn Table 1.72 meters above the ground.
4. The Test Antenna is a bi-log one or a horn one, and the Test Antenna is at the same height as the EUT.
5. The EUT is commanded via the System Simulator (SS) to operate at the maximum output power. A communication link is established between the EUT and the SS.
6. The Spectrum Analyzer is set to max-peak detector function and maximum hold mode.

3.1.3 Frequency Stability Test



1. The test is performed in a Temperature Chamber.
2. The EUT is configured as MS + DC Power Supply.

3.2 Conducted RF Output Power

3.2.1 Requirement

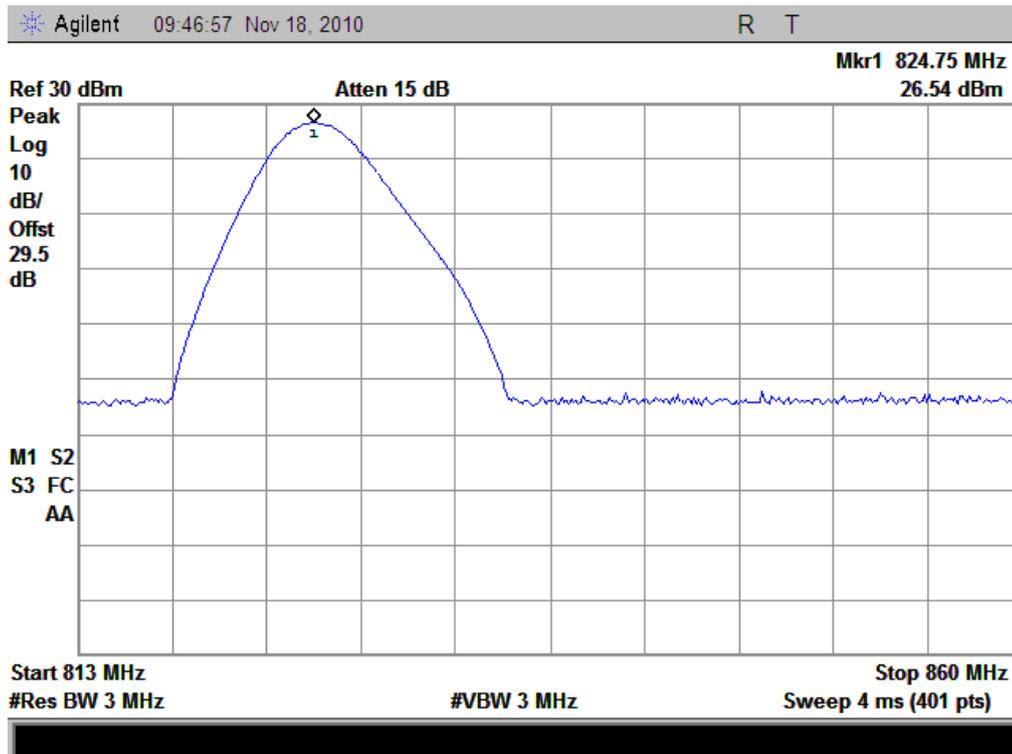
According to FCC §2.1046 (a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033 (c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

3.2.2 Test Procedure

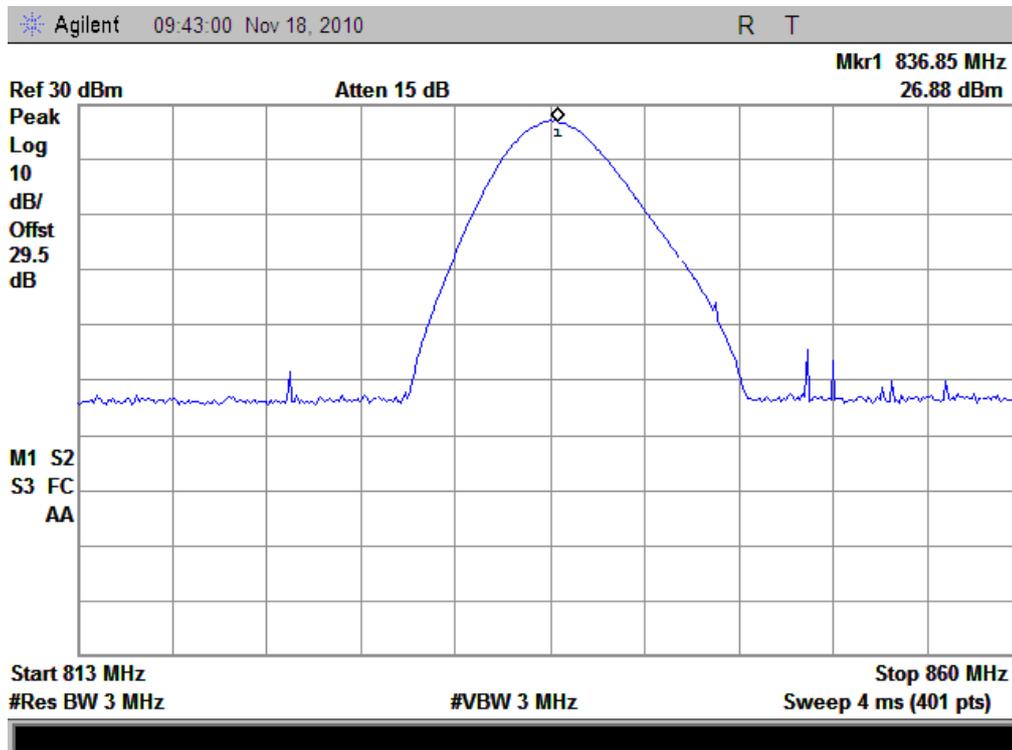
1. Perform test system setup as section 3.1.1 (the radio frequency load attached to the EUT antenna terminal is 50Ω).
2. The resolution bandwidth of the Spectrum Analyzer is set to be comparable to the emission bandwidth of the transmitter, e.g. for GSM modulated signal (here used): RBW=VBW=1MHz, for CDMA modulated signal: RBW=VBW=3MHz.
3. The low, middle and the high channels are selected to perform tests respectively.
4. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak and mark it; finally record the peak and the plot.

3.2.3 Test Result

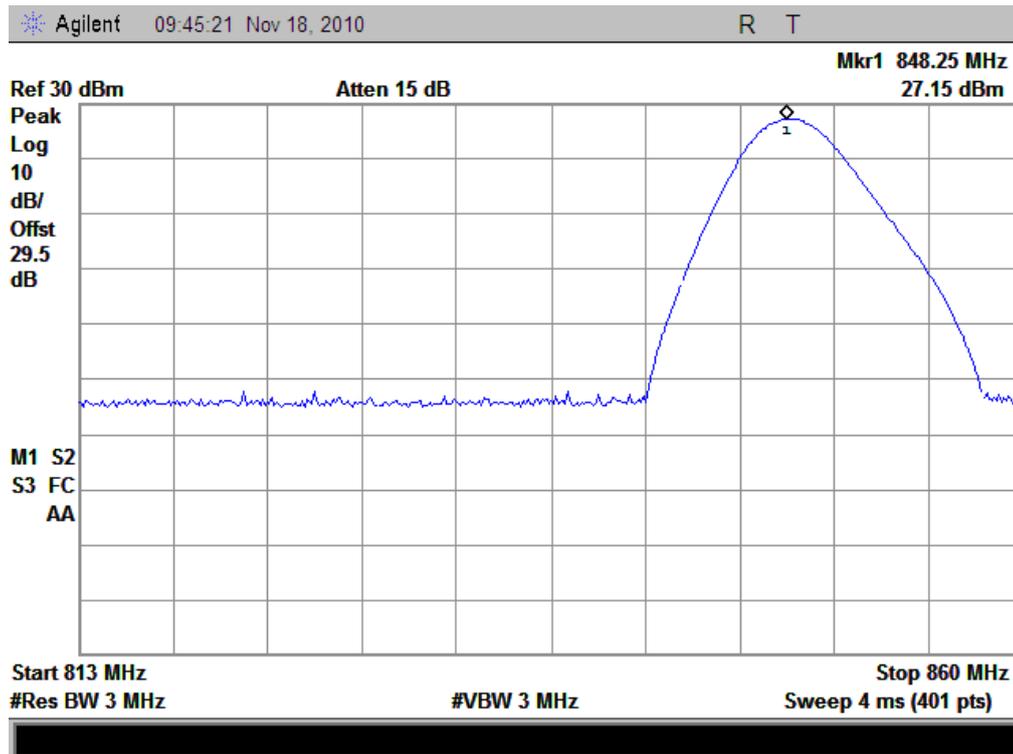
No.	Channel Number	Frequency (MHz)	Measured Power		Rated Power	
			dBm	W	dBm	W
1	1013	824.7	26.54	0.45	33	2
2	384	836.52	26.88	0.49	33	2
3	777	848.31	27.15	0.52	33	2



(Plot A: CDMA 800MHz Channel = 1013)



(Plot B: CDMA 800MHz Channel = 384)



(Plot C: CDMA 800MHz Channel = 777)

3.3 Occupied Bandwidth

3.3.1 Occupied Bandwidth Definition

According to FCC §2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

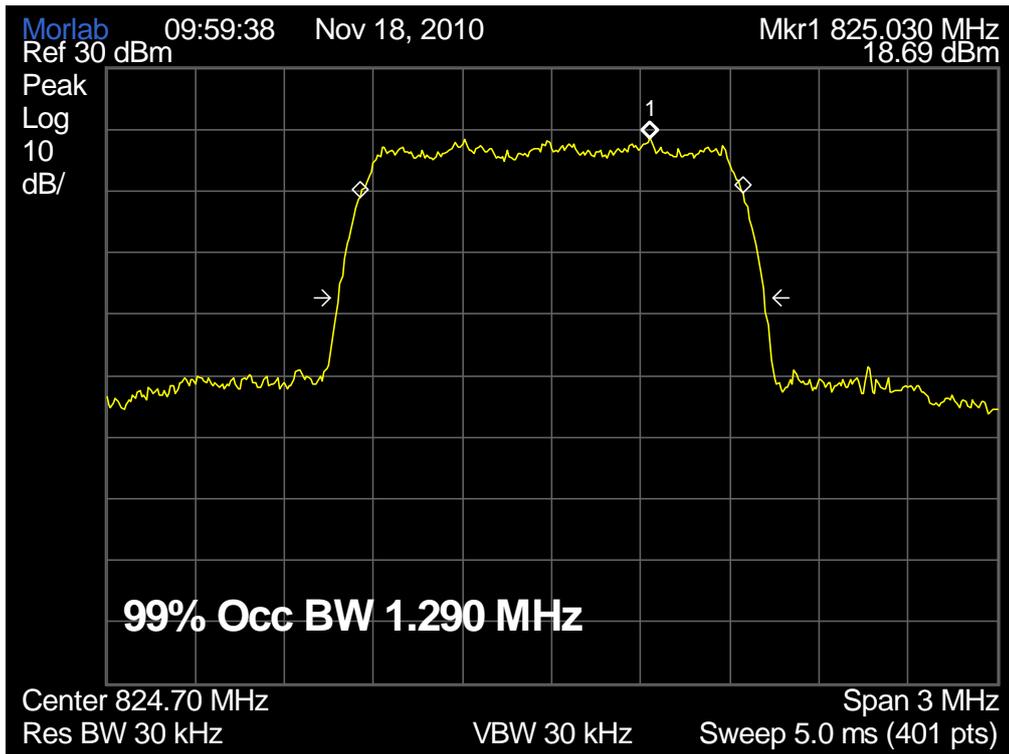
Occupied bandwidth is also known as the 99% emission bandwidth. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

3.3.2 Test Procedure

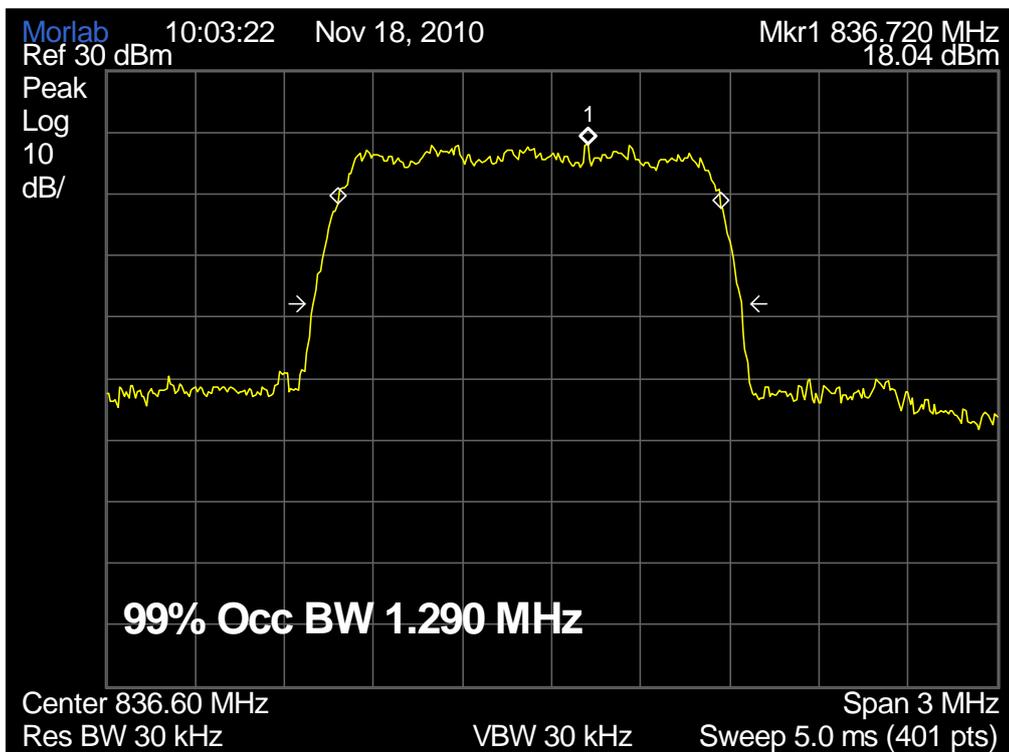
1. Perform test system setup as section 3.1.1.
2. The resolution bandwidth of the Spectrum Analyzer is set to at least one percent of the emission bandwidth, e.g. for GSM modulated signal (here used): $RBW=VBW=3kHz$, for CDMA modulated signal: $RBW=VBW=30kHz$.
3. The low, middle and the high channels are selected to perform tests respectively.
4. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 20dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.

3.3.3 Test Result

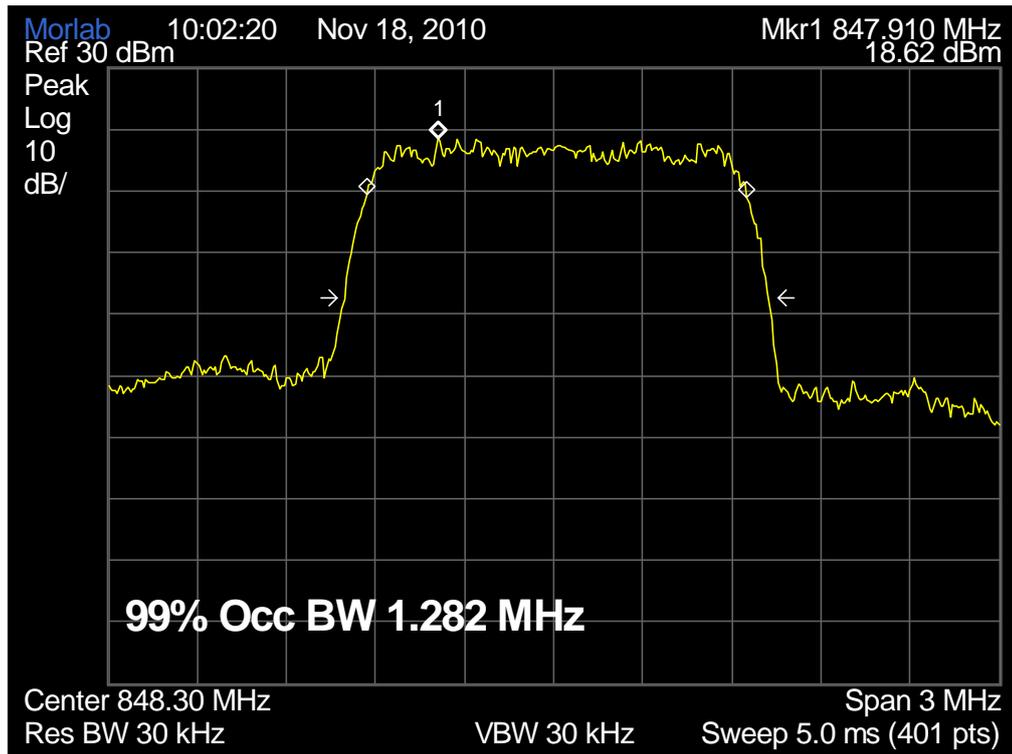
No.	Channel Number	Frequency (MHz)	Measured Occupied Bandwidth (MHz)	Refer to Plot
1	1013	824.7	1.290	Plot A
2	384	836.52	1.290	Plot B
3	777	848.31	1.282	Plot C



(Plot A: CDMA 800MHz Channel = 1013)



(Plot B: CDMA 800MHz Channel = 384)



(Plot C: CDMA 800MHz Channel = 777)

3.4 Conducted Spurious Emission

3.4.1 Requirement

According to FCC §22.917(a), 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. This calculated to be -13dBm.

According to FCC §22.917 (a), in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Thus the 26dB emission bandwidth is measurement for showing compliance at the band-edge.

3.4.2 Test Procedure

1. Perform test system setup as section 3.1.1.
2. Make a limit line whose value is -13dBm on the Spectrum Analyzer.
3. The lowest, middle and the highest channels are selected to perform tests respectively.
4. Set the RBW of the Spectrum Analyzer to 1MHz, and the measuring frequency range from 9kHz to 10th harmonic of the fundamental frequency (here used 10GHz); mark the fundamental frequency and the harmonics thereof; finally record the harmonics and the plot. Note: the measuring frequency range can be divided into several parts to perform tests.
5. In the 1MHz bands immediately outside and adjacent to the frequency black, the RBW of the Spectrum Analyzer was set to at least one percent of the emission bandwidth of the fundamental emission of the transmitter, e.g. for GSM modulated signal (here used): RBW=3kHz, for CDMA modulated signal: RBW=30kHz.

3.4.3 Test Result

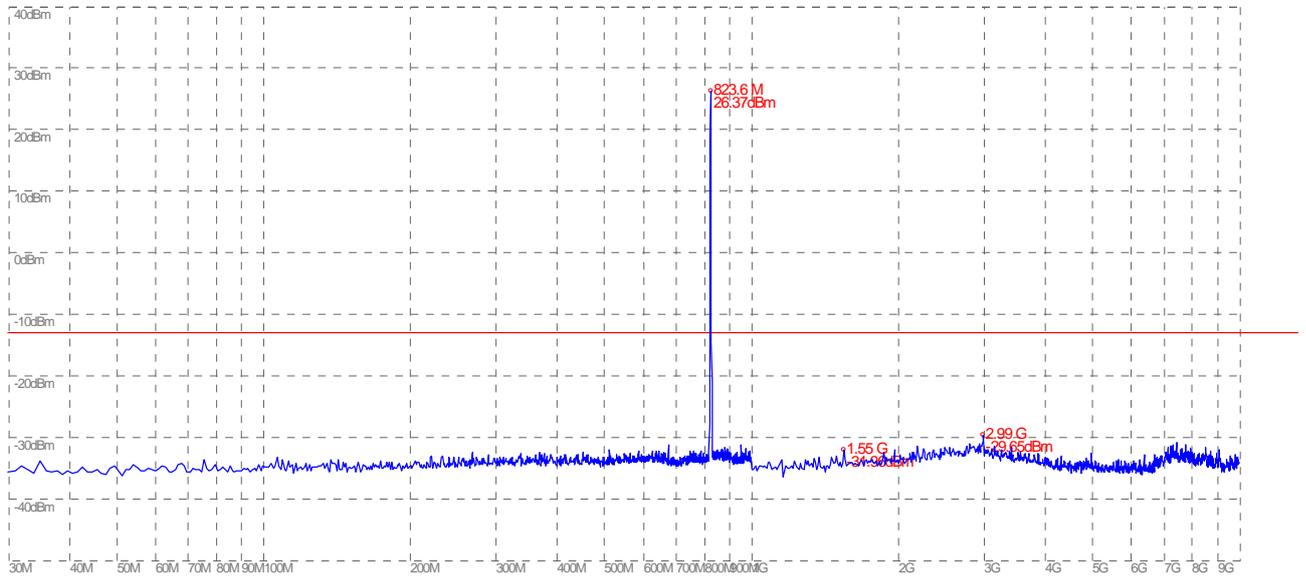
Table for the Harmonics and Plots for the Spurious Emission

1. Table for the Harmonics:

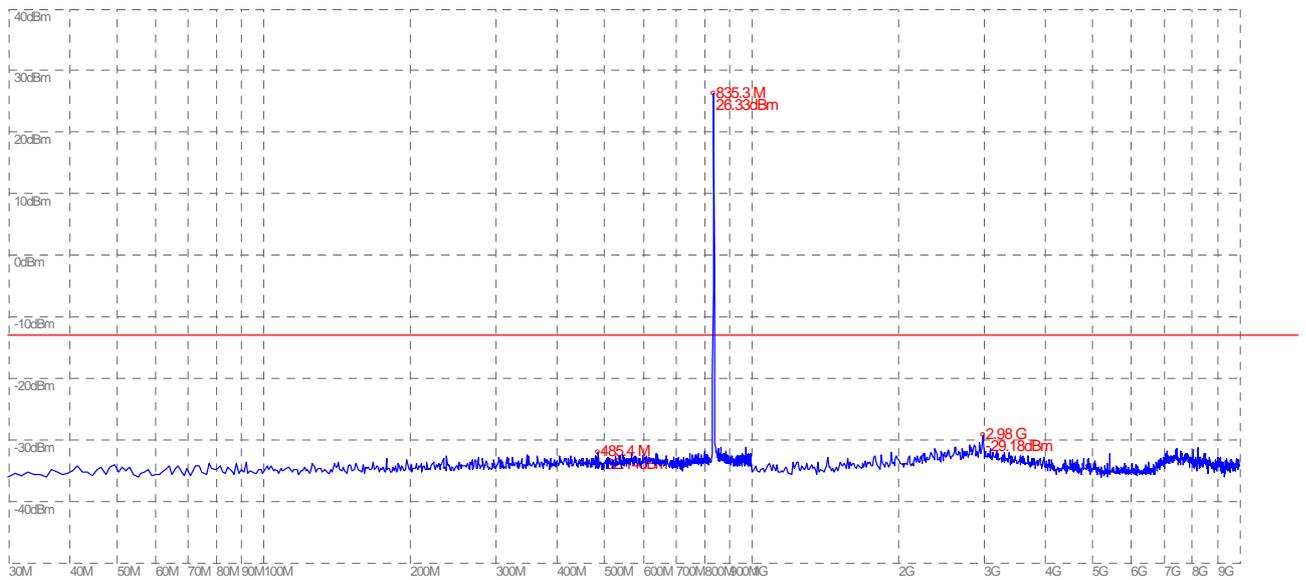
No.	Channel	Frequency(MHz)	Measured Max Spurious Emission(dBm)	Limit(dBm)
1.	1013	824.7	-29.65	-13
2.	384	836.52	-29.18	-13
3.	777	848.31	-29.62	-13

2. Plot for Spurious Emission:

Note: the power of the EUT transmitting frequency should be ignored.



(Plot A: CDMA 800MHz Channel = 1013, 30MHz to 10GHz)



(Plot B: CDMA 800MHz Channel = 384, 30MHz to 10GHz)



(Plot C: CDMA 800MHz Channel = 777, 30MHz to 10GHz)

3.5 Band Edge

3.5.1 Requirement

According to FCC section 22.917(b) , in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

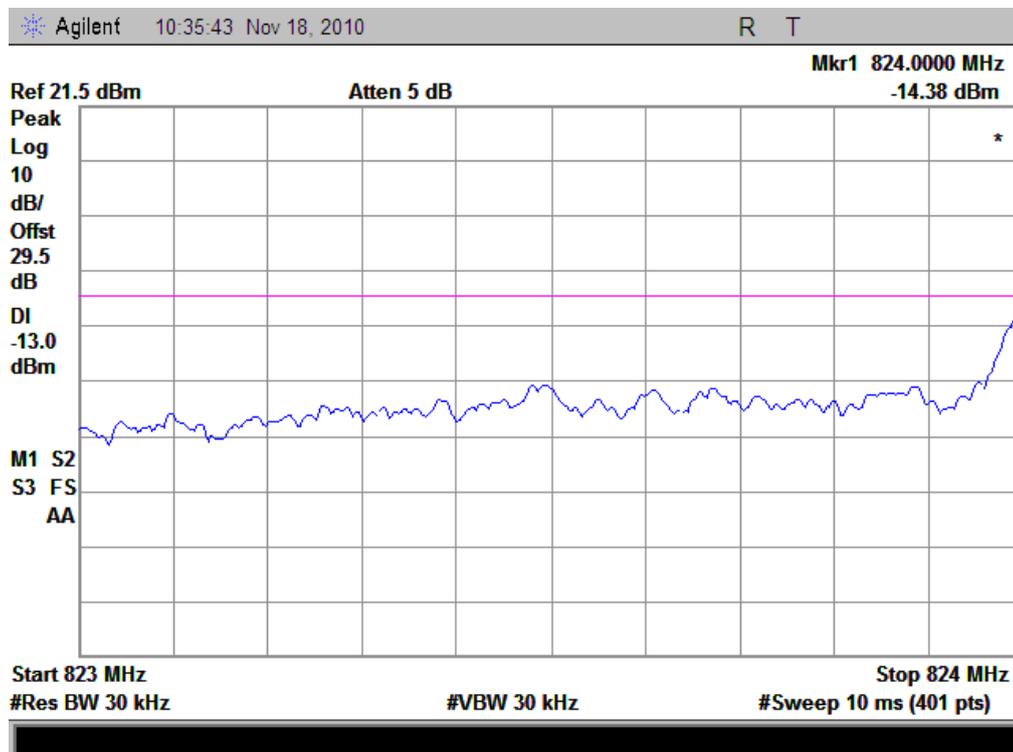
3.5.2 Test Result

The lowest and highest channels are tested to verify the band edge emissions.

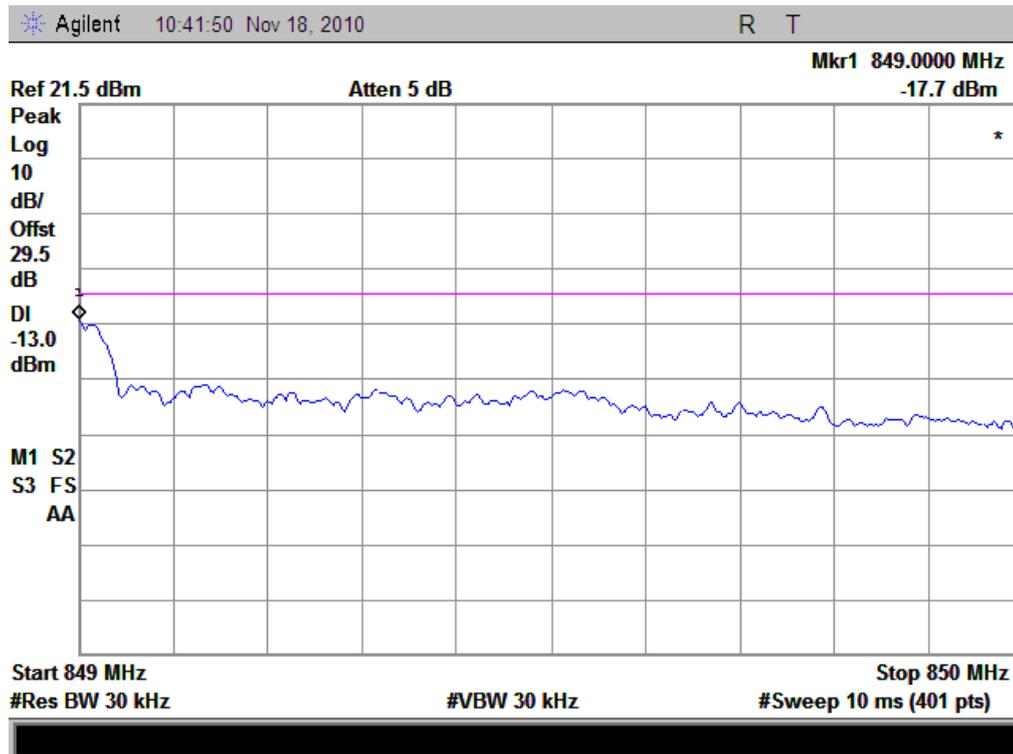
1. Test Verdict:

Band	Channe 1	Frequency (MHz)	Measured Max. Band Edge Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
CDMA 800MHz	1013	824.7	-14.38	Plat A	-13	PASS
	777	848.31	-17.70	Plot B		PASS

2. Plots



(Plot A: CDMA 800MHz Channel = 1013)



(Plot B: CDMA 800MHz Channel = 777)

3.6 Transmitter Radiated Power (ERP)

3.6.1 Requirement

According to FCC §22.913, the ERP of Cellular mobile transmitters must not exceed 7 Watts (38.5dBm).

3.6.2 Test Description

Please refer to section 3.1.2 of this report for the test setup.

The EUT, which is powered by the Battery charged with the AC Adapter, is located in a 3m Full-Anechoic Chamber; the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

The Test Antenna is a Bi-Log one (used for 30MHz to 1GHz) or a Horn one (used for above 3GHz), and it's located at the same height as the EUT. The Filters consists of Notch Filters and High Pass Filter.

1. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB43130131	2009.09	2year
Spectrum Analyzer	Agilent	E7405A	US44210471	2009.09	2year
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2009.09	2year
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2009.09	2year
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2009.09	2year

3.6.3 Test Procedure

1. Perform test system setup as section 3.1.2.
2. The resolution bandwidth of the Spectrum Analyzer is set to be comparable to the emission bandwidth of the transmitter, e.g. for GSM modulated signal (here used): RBW=VBW=1MHz, for CDMA modulated signal: RBW=VBW=3MHz.
3. The low, middle and the high channels are selected to perform tests respectively.
4. Employ the bi-log Test Antenna as the test system receiving antenna; set the polarization of the Test Antenna to be the same as that of the EUT transmitting antenna.
5. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; actuate the Turn Table to turn from 0 degrees to 360 degrees to find the maximum reading via the Spectrum Analyzer, mark the peak; finally record the peak and the plot.

3.6.4 Test Result

The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested.

The substitution corrections are obtained as described below:

$$A_{\text{SUBST}} = P_{\text{SUBST_TX}} - P_{\text{SUBST_RX}} - L_{\text{SUBST_CABLES}} + G_{\text{SUBST_TX_ANT}}$$

$$A_{\text{TOT}} = L_{\text{CABLES}} + A_{\text{SUBST}}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain.

$P_{\text{SUBST_TX}}$ is signal generator level,

$P_{\text{SUBST_RX}}$ is receiver level,

$L_{\text{SUBST_CABLES}}$ is cable losses including TX cable

$G_{\text{SUBST_TX_ANT}}$ is substitution antenna gain.

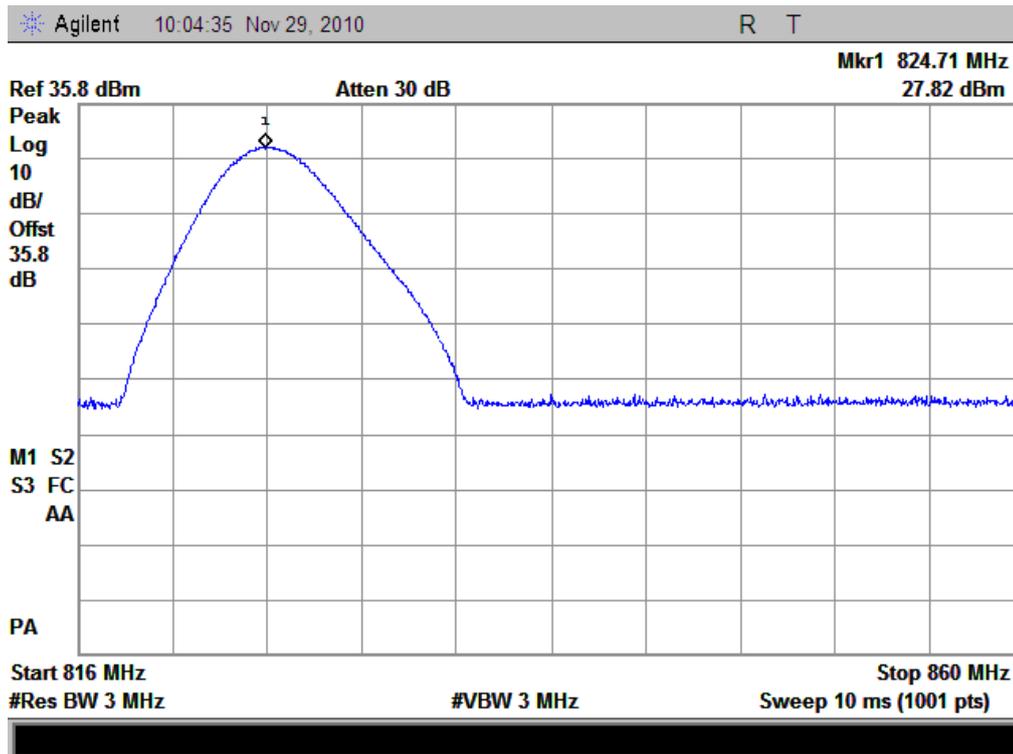
A_{TOT} is total correction factor including cable loss and substitution correction

During the test, the data of A_{TOT} was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of A_{TOT} .

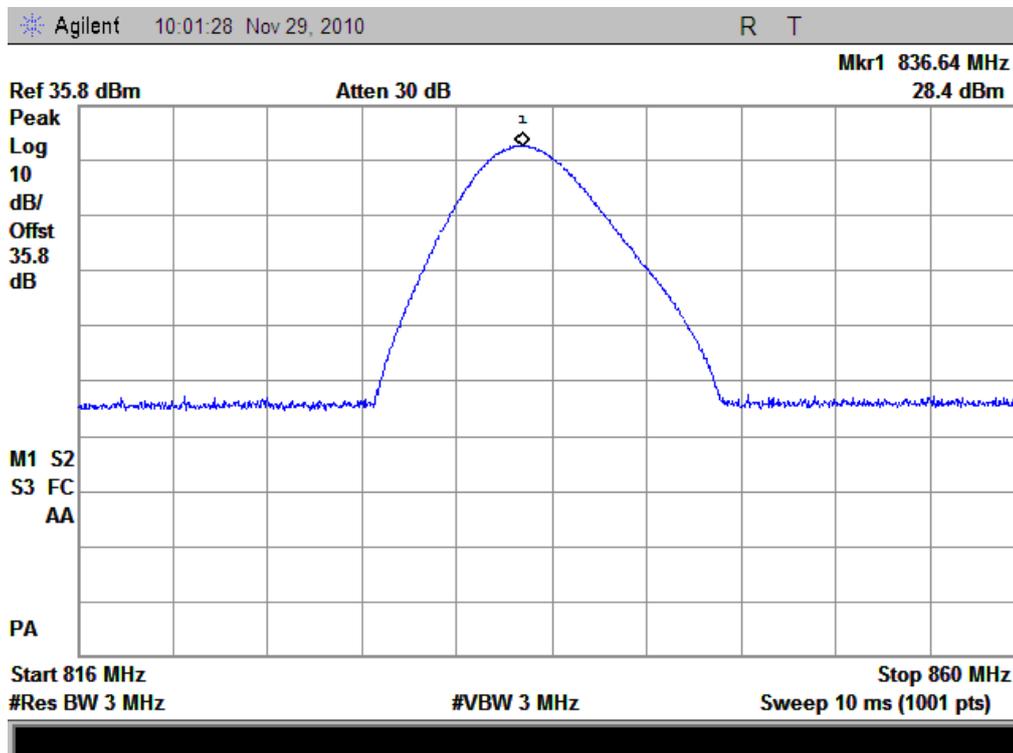
1. Test Verdict:

No.	Channel	Frequency (MHz)	Measured ERP		Limit ERP	
			dBm	W	dBm	W
1	1013	824.7	27.82	0.61	< 38.5	< 7
2	384	836.52	28.40	0.69	< 38.5	< 7
3	777	848.31	28.17	0.66	< 38.5	< 7

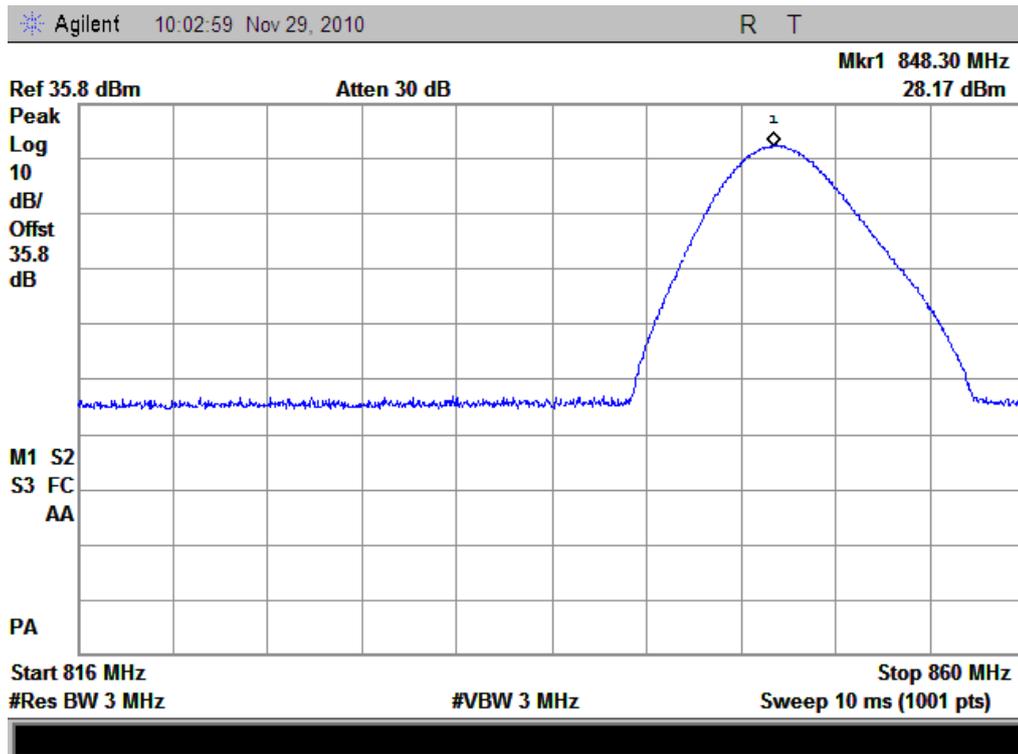
2. The plots:



(Plot A: CDMA 800MHz Channel = 1013)



(Plot B: CDMA 800MHz Channel = 384)



(Plot C: CDMA 800MHz Channel = 777)

3.7 Radiated Spurious Emission

3.7.1 Requirement

According to FCC §22.917(a), 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. This calculated to be -13dBm.

3.7.2 Test Procedure

1. Perform test system setup as section 3.1.2.
2. Make a limit line whose value is -13dBm on the Spectrum Analyzer, and set the RBW of the Spectrum Analyzer to 1MHz.
3. The low, middle and the high channels are selected to perform tests respectively.
4. Employ the bi-log Test Antenna as the test system receiving antenna and set the frequency range of the Spectrum Analyzer from 30MHz to 3GHz.
5. The measurement is performed with the Test Antenna at both horizontal and vertical polarization respectively. Set the polarization of the Test Antenna to be horizontal.
6. Actuate the Turn Table to turn from 0 degrees to 360 degrees to find the maximum reading via the Spectrum Analyzer, mark the fundamental frequency and the harmonics thereof, after then record the harmonics and the plot.
7. Set the polarization of the Test Antenna to be vertical, then repeat step 6.
8. Employ the horn Test Antenna as the test system receiving antenna and set the frequency range of the Spectrum Analyzer from 3GHz to 10th harmonic of the fundamental frequency (here used 10GHz), then repeat step 5 to 7.

3.7.3 Test Result

1. Test Verdict:

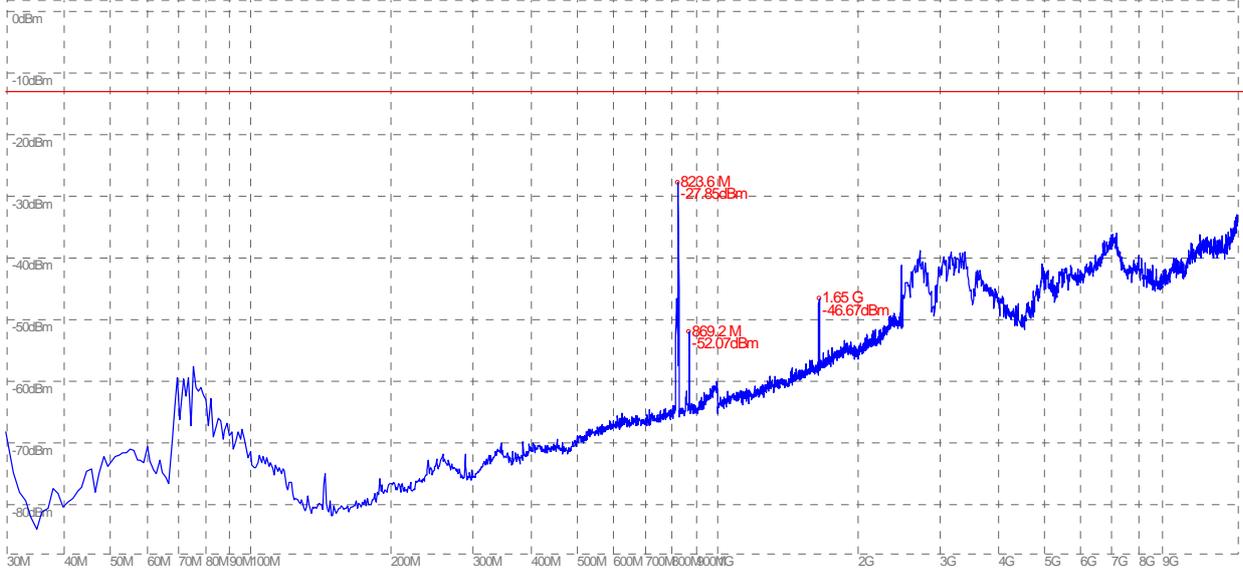
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)		Refer to Plot	Limit (dBm)	Verdict
			Test Antenna Horizontal	Test Antenna Vertical			
CDMA 800MHz	1013	824.7	-45.90	-46.67	Plot A.1/A.2	-13	PASS
	384	836.52	-49.50	-53.14	Plot B.1/B.2		PASS
	777	848.31	-51.00	-48.53	Plot C.1/C.2		PASS

2. Test Plot for the Whole Measurement Frequency Range:

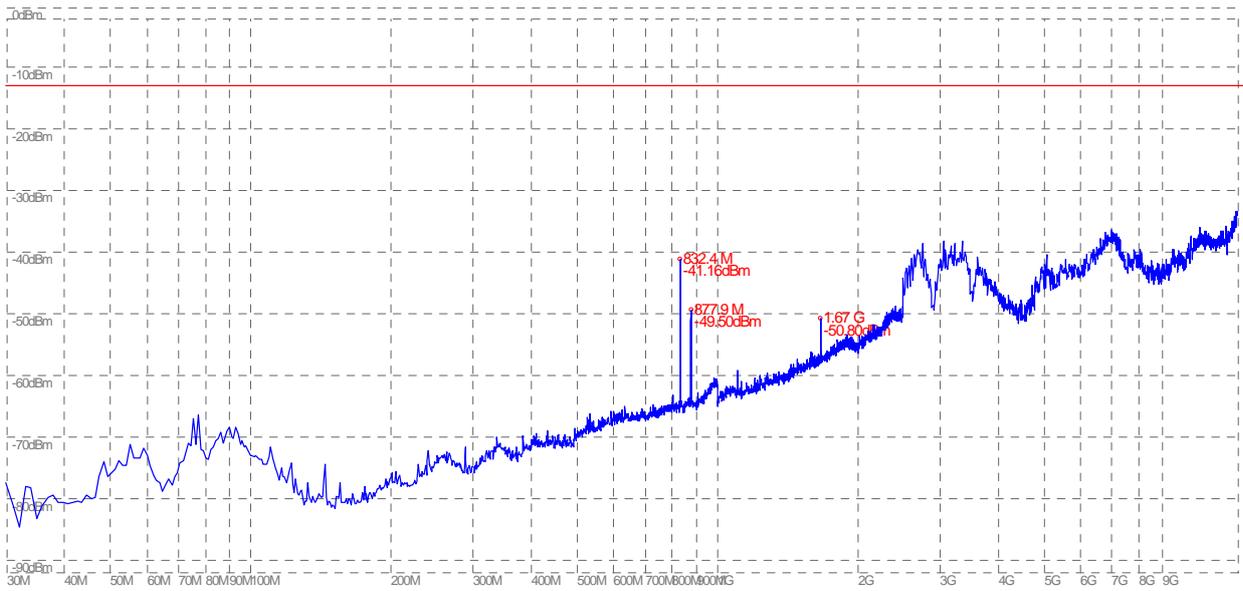
Note: the power of the EUT transmitting frequency should be ignored.



(Plot A.1: Plot when the TCH number set to 1013, Test Antenna Horizontal)



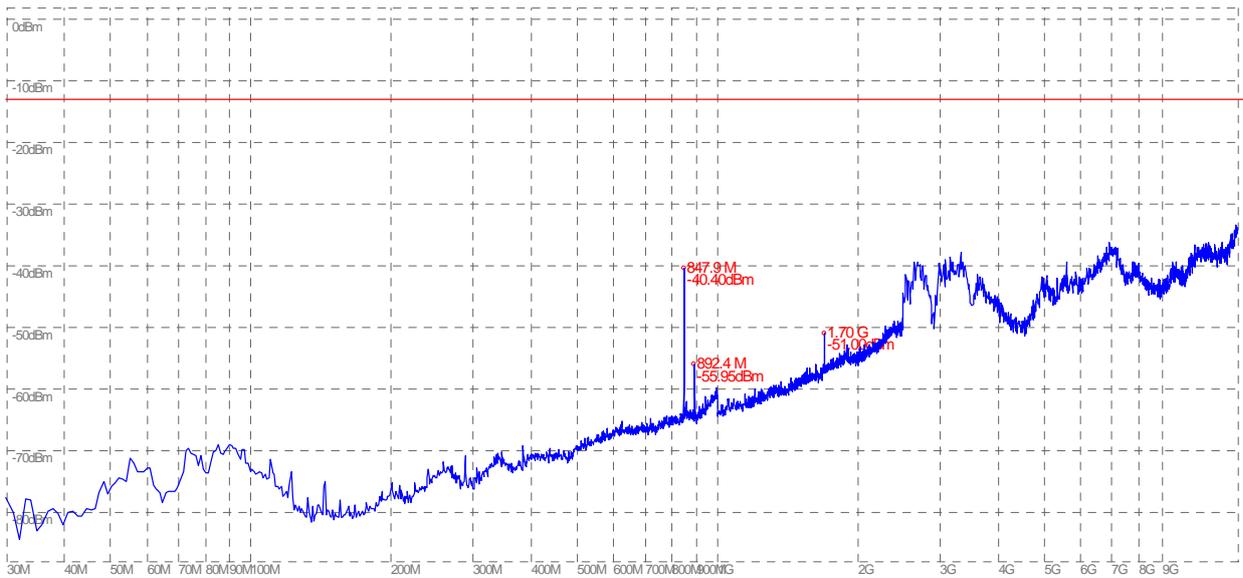
(Plot A.2: Plot when the TCH number set to 1013, Test Antenna Vertical)



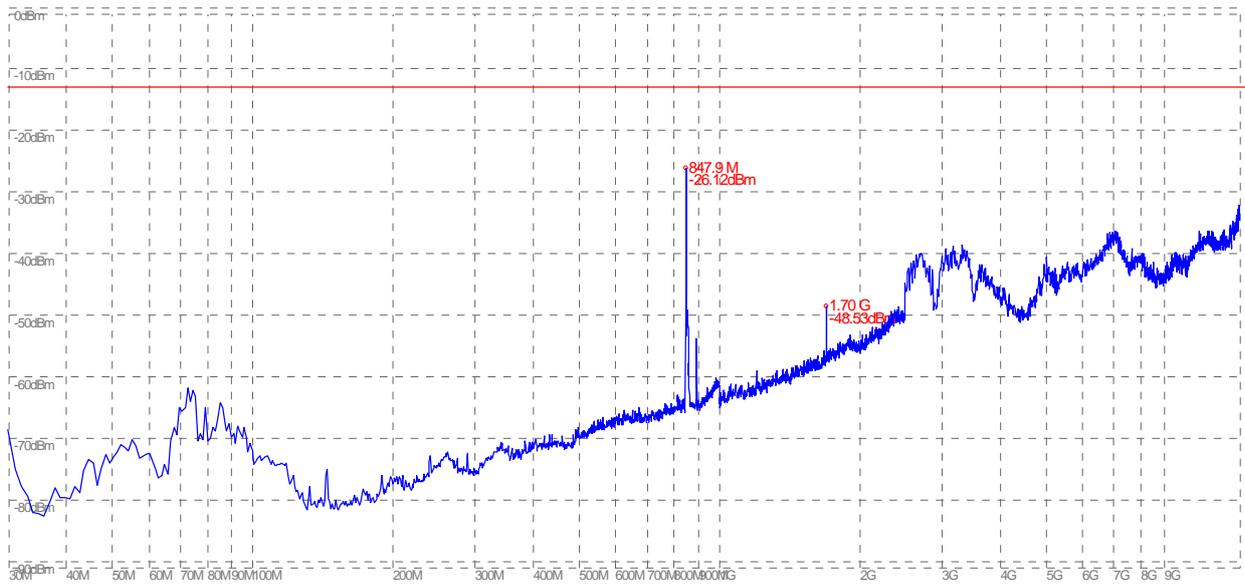
(Plot B.1: Plot when the TCH number set to 384, Test Antenna Horizontal)



(Plot B.2: Plot when the TCH number set to 384, Test Antenna Vertical)



(Plot C.1: Plot when the TCH number set to 777, Test Antenna Horizontal)



(Plot C2: Plot when the TCH number set to 777, Test Antenna Vertical)

3.8 Frequency Stability

3.8.1 Frequency Stability Requirement

According to FCC §22.355, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

According to FCC §2.1055, the test conditions are:

- (a) Temperature:
The temperature is varied from -30°C to $+50^{\circ}\text{C}$ at intervals of not more than 10°C .
- (b) Primary Supply Voltage:
For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

3.8.2 Test Procedure

1. Perform test system setup as section 3.1.3.
2. Set the voltage of the DC Power Supply to normal supply voltage (here used 3.7V) and the temperature of the Temperature Chamber to vary from -30°C to $+50^{\circ}\text{C}$ at intervals of 10°C .
3. At each temperature level, the EUT is powered off and kept in the Temperature Chamber for two hours. After sufficient stabilization, turn on the EUT, command it via the System Simulator (SS) to operate at the maximum output power i.e. A communication link is established between the EUT and the SS.
4. The low, middle and the high channels are selected to perform tests respectively. Set the TCH number to 1013 as the low channel.
5. The frequency deviation is measured (directly read from the SS, which can report the parameter) within three minutes.
6. Set the TCH number to 384 as the middle channel, then repeat step 5.
7. Set the TCH number to 777 as the high channel, then repeat step 5.
8. Adjust the temperature of the Temperature Chamber as specified in step 2, then repeat step 3 to 7.
9. Set the voltage of the DC Power Supply to high extreme supply voltage (here used 4.2V) and the temperature of the Temperature Chamber to normal (here used $+22^{\circ}\text{C}$), then repeat step 3 to 8.
10. Set the voltage of the DC Power Supply to low extreme supply voltage (here used 3.6V) and the temperature of the Temperature Chamber to normal (here used $+22^{\circ}\text{C}$), then repeat step 3 to 8.



3.8.3 Test Result

No.	Test Conditions		Frequency Deviation at Channels Used						limits
	Voltage	Temperature	1013		384		777		
			Hz	ppm	Hz	ppm	Hz	ppm	
1	3.7V	-30°C	17.56	0.014	10.25	0.009	13.78	0.012	±2.5ppm
2		-20°C	-19.08	-0.016	-19.83	-0.017	-5.66	-0.005	
3		-10°C	20.33	0.017	23.05	0.019	11.35	0.010	
4		0°C	15.92	0.013	11.57	0.010	13.09	0.011	
5		+10°C	-2.15	-0.002	-12.35	-0.010	-7.83	-0.007	
6		+20°C	19.74	0.016	12.59	0.011	8.54	0.007	
7		+30°C	10.21	0.008	-3.02	-0.003	15.63	0.013	
8		+40°C	17.65	0.015	11.54	0.010	9.88	0.008	
9		+50°C	13.05	0.011	-9.87	-0.008	10.42	0.009	
10	4.2V	+22°C	9.87	0.008	13.67	0.011	-3.26	-0.003	
11	3.6V	+22°C	-5.22	-0.004	-18.69	-0.016	19.32	0.016	

TEST Result: PASS

******* END OF REPORT*******