



47 CFR PART 22H

TEST REPORT

of

Mobile Phone

Trade Name: Lenovo
Brand Name: Lenovo
Model Name: E160C
Report No.: SZ10090062E01
FCC ID.: YCNE160C

prepared for

LENOVO MOBILE COMMUNICATION TECHNOLOGY LTD.

No.999, Qishan North 2nd Road, Information & Optoelectronics Park, Torch Hi-tech Industry
Development Zone, Xiamen, P. R. China

prepared by

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Bluetooth®

CTIA Authorized Test Lab

LAB CODE 20081223-00

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Change History		
Issue	Date	Reason for change
1.0	September 26, 2010	First edition

1. Test Result Certification

Equipment under Test: Mobile Phone

Trade Name: Lenovo
Brand Name: Lenovo
Model Name: E160C
FCC ID: YCNE160C
Applicant: LENOVO MOBILE COMMUNICATION TECHNOLOGY LTD.
No.999, Qishan North 2nd Road, Information & Optoelectronics Park,
Torch Hi-tech Industry Development Zone, Xiamen, P. R. China
Manufacturer: LENOVO MOBILE COMMUNICATION TECHNOLOGY LTD.
No.999, Qishan North 2nd Road, Information & Optoelectronics Park,
Torch Hi-tech Industry Development Zone, Xiamen, P. R. China
Test Standards: 47 CFR Part 2
47 CFR Part 22 Subpart H
Test Date(s): September 13, 2010 – September 17, 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:  Dated: 2010.9.26
Cao Shaocong

Reviewed by:  Dated: 2010.09.26
Ni Yong

Approved by:  Dated: 2010.9.26
Shu Luan



2. General Information

2.1 Equipment under Test (EUT) Description

Description: Mobile Phone
Model Name: E160C
Serial No.: N/A
Hardware Version: H201
Software Version.....: E160C_S123_100427
Emission Designator.....: 1M25F9W
Modulation: CDMA 1X
Frequency: Tx: 824.7 – 848.31 MHz; Rx: 869.7-893.31MHz
Power Supply:: Battery
Brand name: Lenovo
Model Name: BL139
Capacitance: 800mAh
Rated voltage: 3.7V
Charge limited: 4.2V
Accessory Equipment:..... AC Adapter (Charger for Battery)
Brand Name: Lenovo
Model Name: C-P13
Rated Input: ~ 220V, 15 mA, 50/60Hz
Rated Output: = 5V, 500mA

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

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: WEINSCHTEL 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

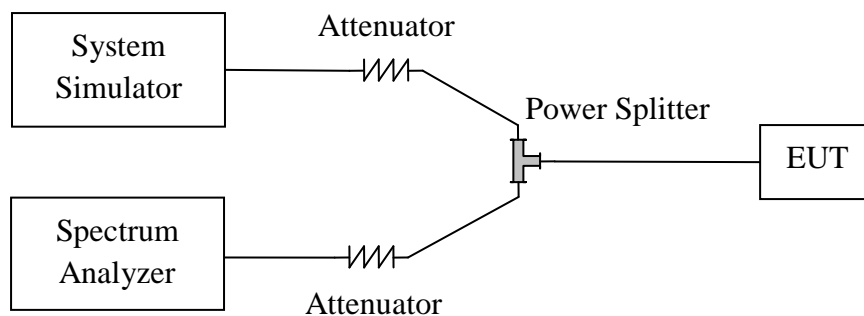
During the measurement, the environmental conditions were within the listed ranges:

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

3. 47 CFR Part 2, Part 22H Requirements

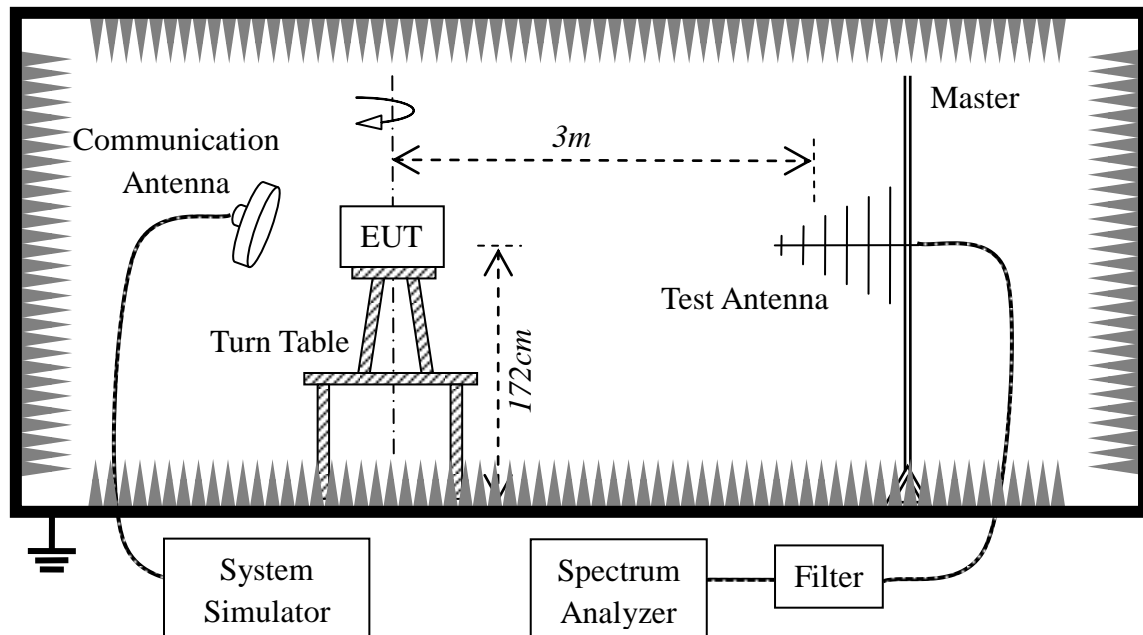
3.1 General Information

3.1.1 Conducted Related Tests



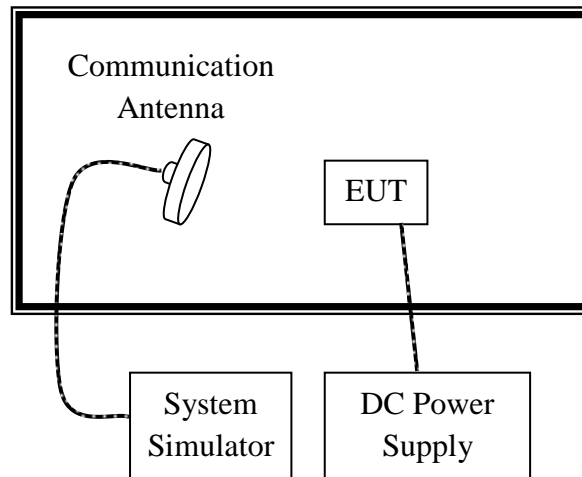
1. The EUT is coupled to the Spectrum Analyzer and the System Simulator with the suitable Attenuators through the Power Splitter; the path loss is calibrated to correct the reading.
2. The EUT is configured here as MS + Battery.
3. The EUT is commanded via the System Simulator (SS) to operate at the 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

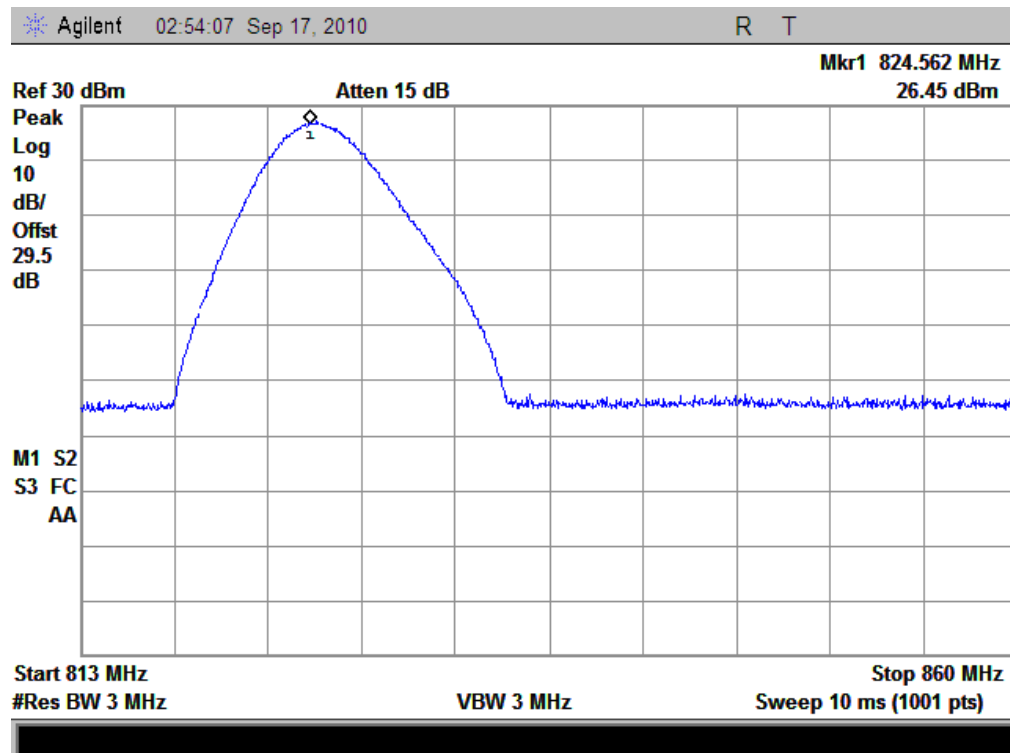
According to FCC §2.1046 (a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and 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

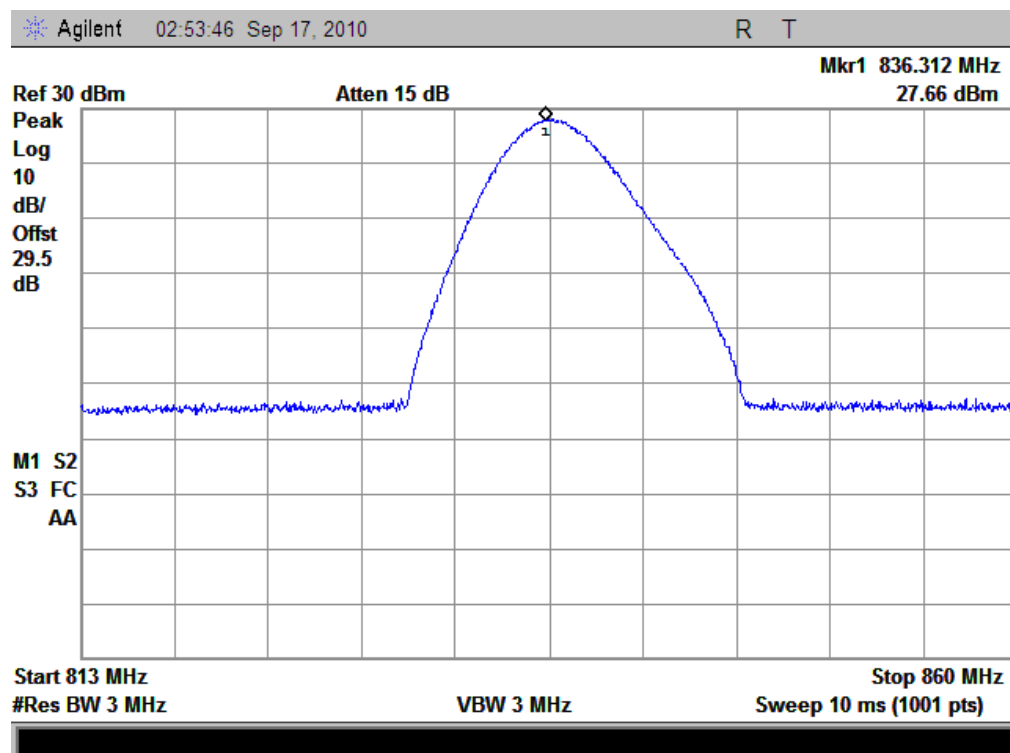
1. Perform test system setup as section 3.1.1 (the radio frequency load attached to the EUT antenna terminal is 50Ω).
2. The resolution bandwidth of the Spectrum Analyzer is set to be comparable to the emission bandwidth of the transmitter, e.g. for GSM modulated signal (here used): RBW=VBW=1MHz, for 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

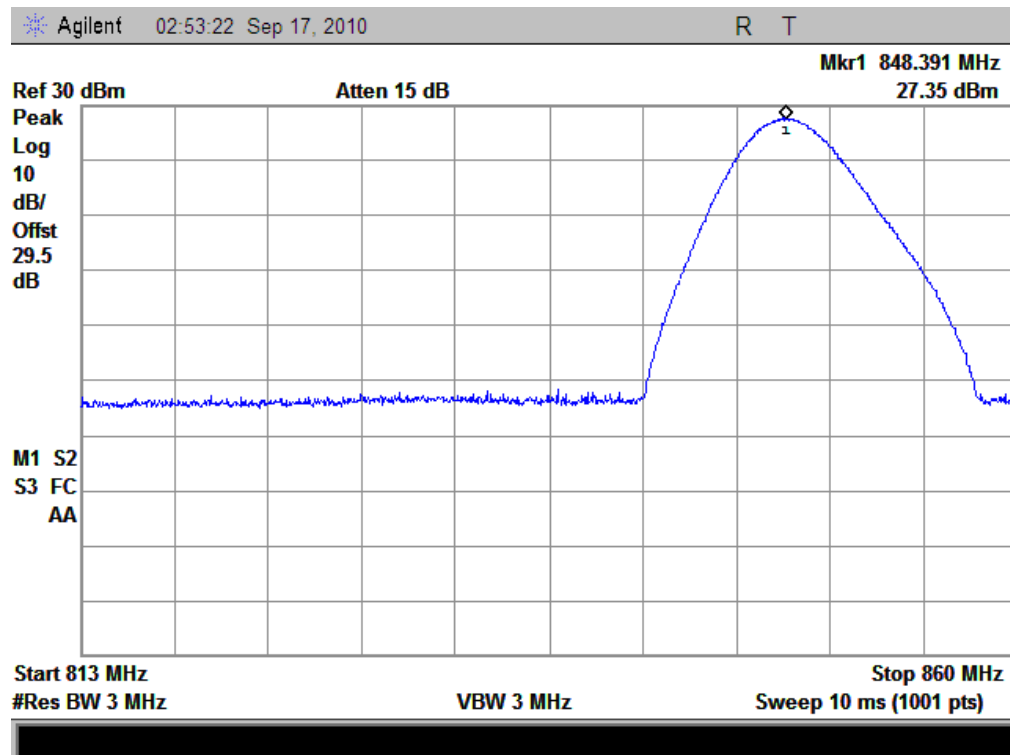
No.	Channel Number	Frequency (MHz)	Measured Power		Rated Power	
			dBm	W	dBm	W
1	1013	824.7	26.45	0.44	33	2
2	384	836.52	27.66	0.58	33	2
3	777	848.31	27.35	0.54	33	2



(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.

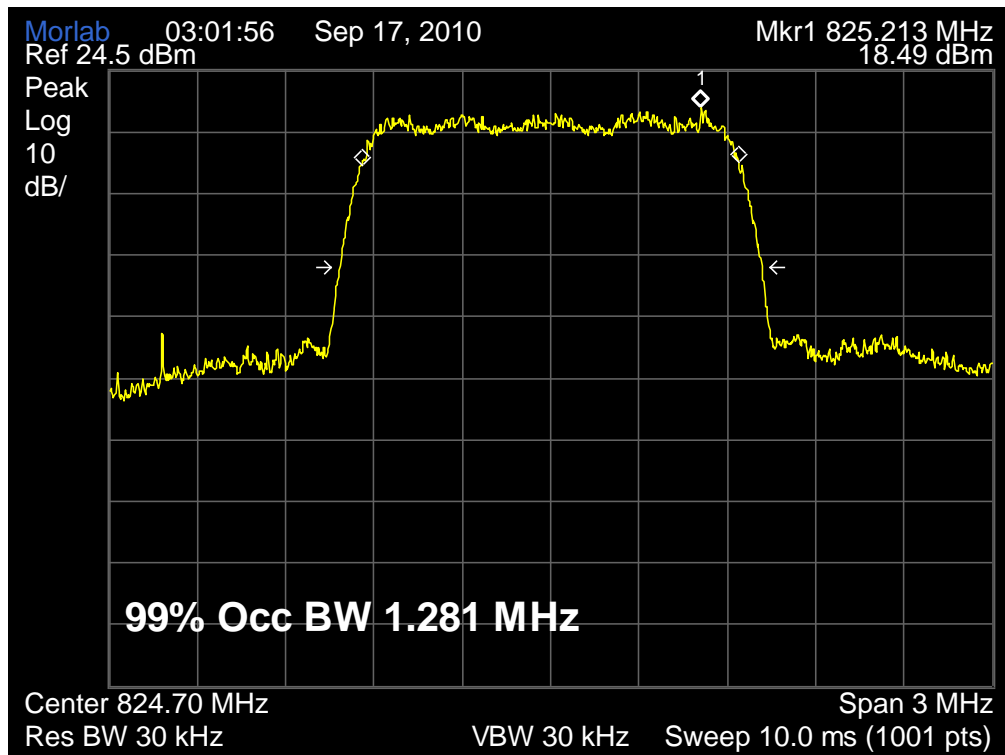
Occupied bandwidth is also known as the 99% emission bandwidth. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter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

3.3.2 Test Procedure

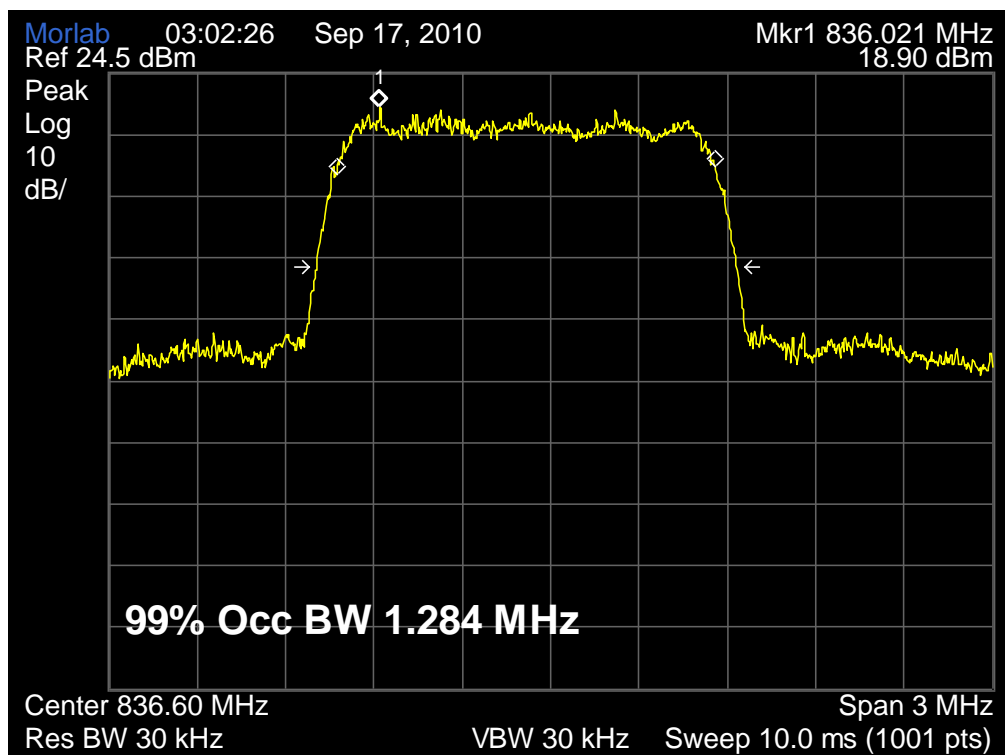
1. Perform test system setup as section 3.1.1.
2. The resolution bandwidth of the Spectrum Analyzer is set to at least one percent of the emission bandwidth, e.g. for GSM modulated signal (here used): $RBW=VBW=3kHz$, for CDMA modulated signal: $RBW=VBW=30kHz$.
3. The low, middle and the high channels 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

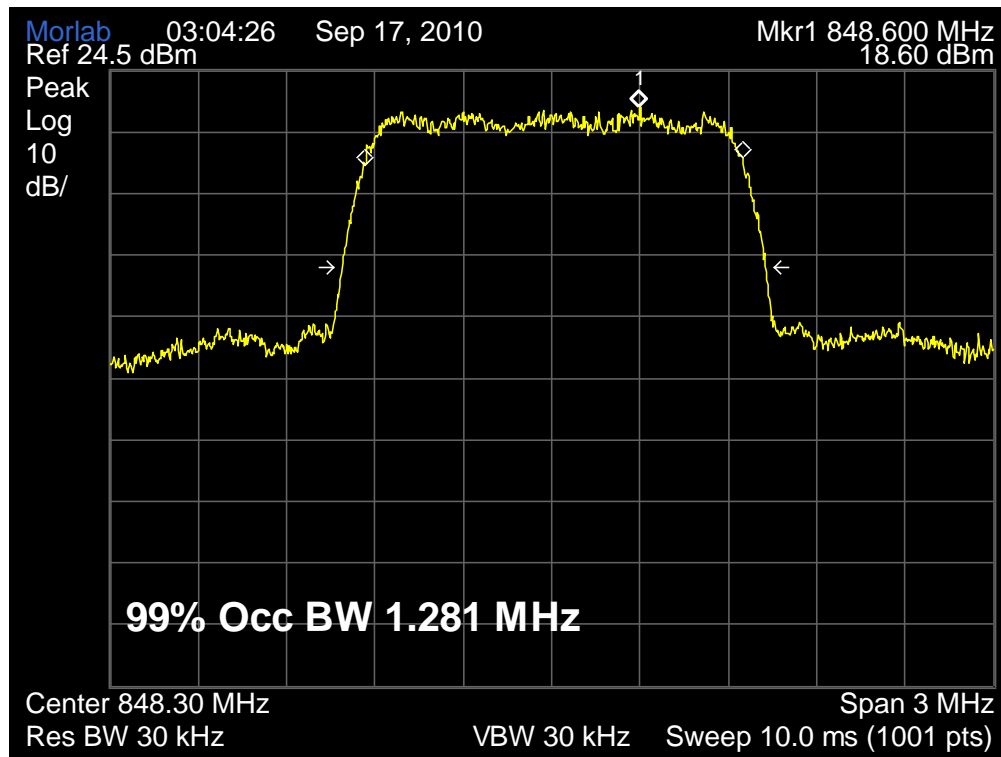
No.	Channel Number	Frequency (MHz)	Measured Occupied Bandwidth (MHz)	Refer to Plot
1	1013	824.7	1.281	Plot A
2	384	836.52	1.284	Plot B
3	777	848.31	1.281	Plot C



(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

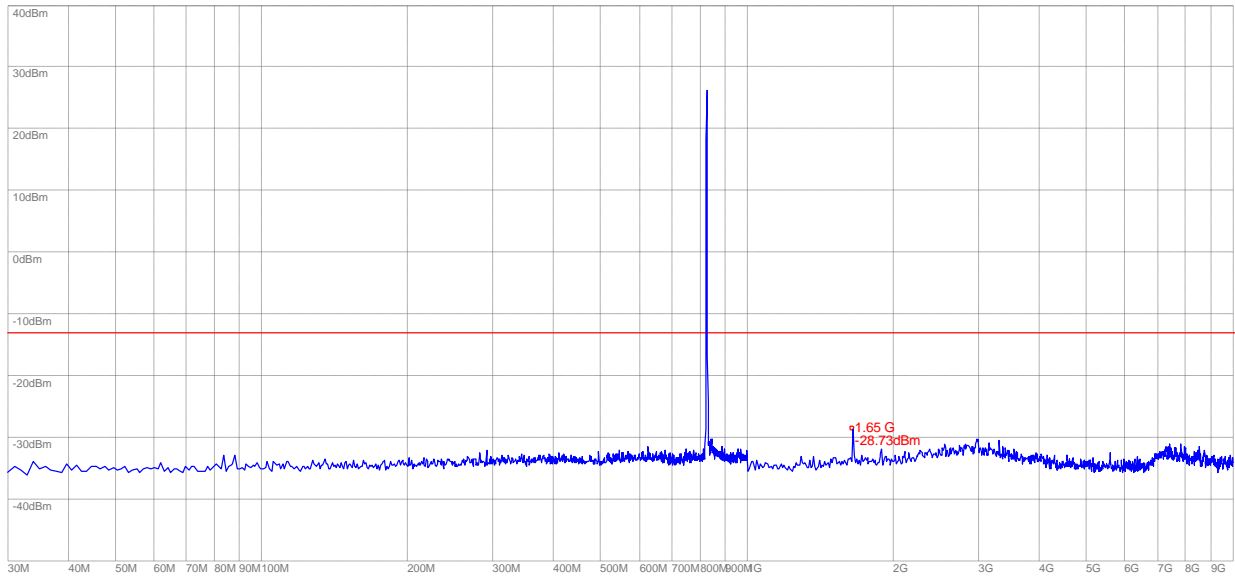
Table for the Harmonics and Plots for the Spurious Emission

1. Table for the Harmonics:

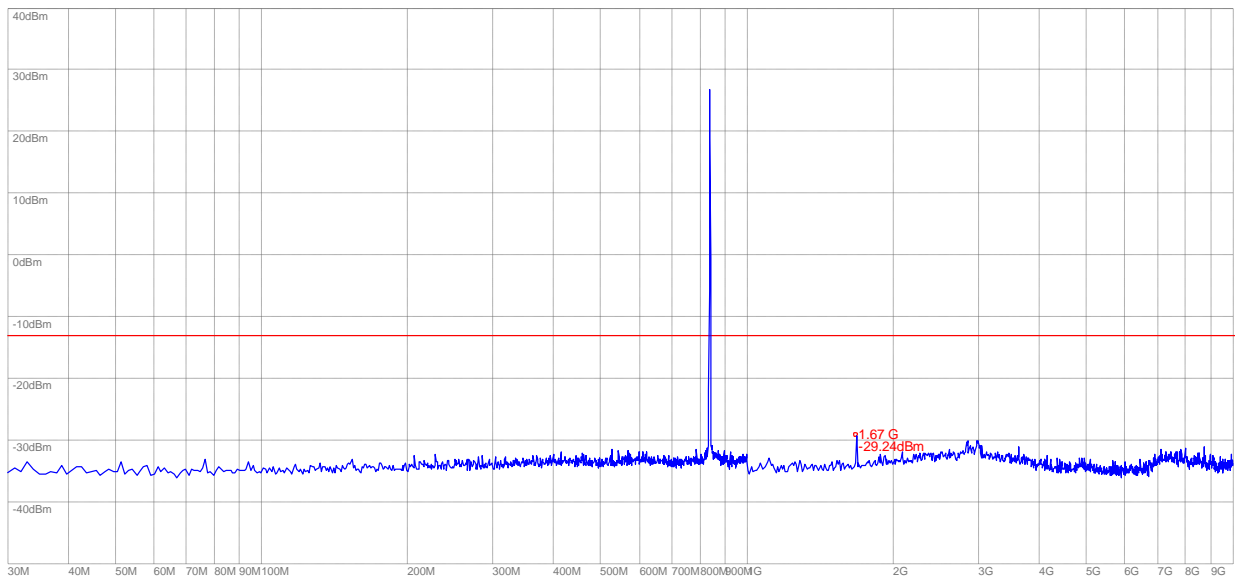
No.	Channel	Frequency(MHz)	Measured Max Spurious Emission(dBm)	Limit(dBm)
1.	1013	824.7	-29.24	-13
2.	384	836.52	-28.76	-13
3.	777	848.31	-28.73	-13

2. Plot for Spurious Emission:

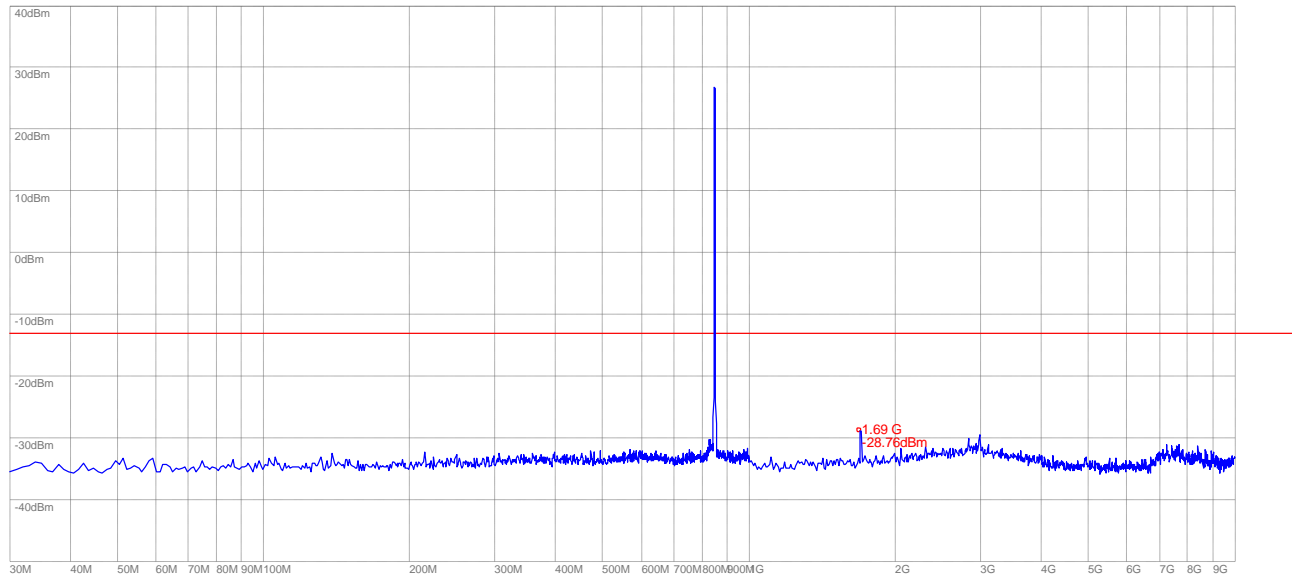
Note: the power of the EUT transmitting frequency should be ignored.



(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.

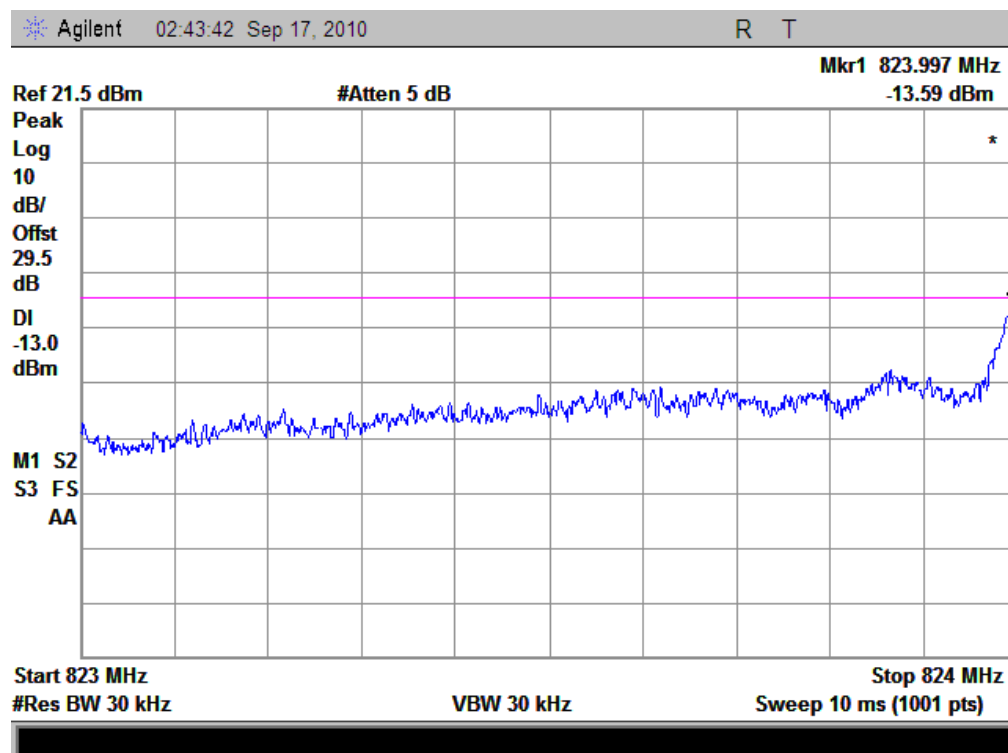
3.5.2 Test Result

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

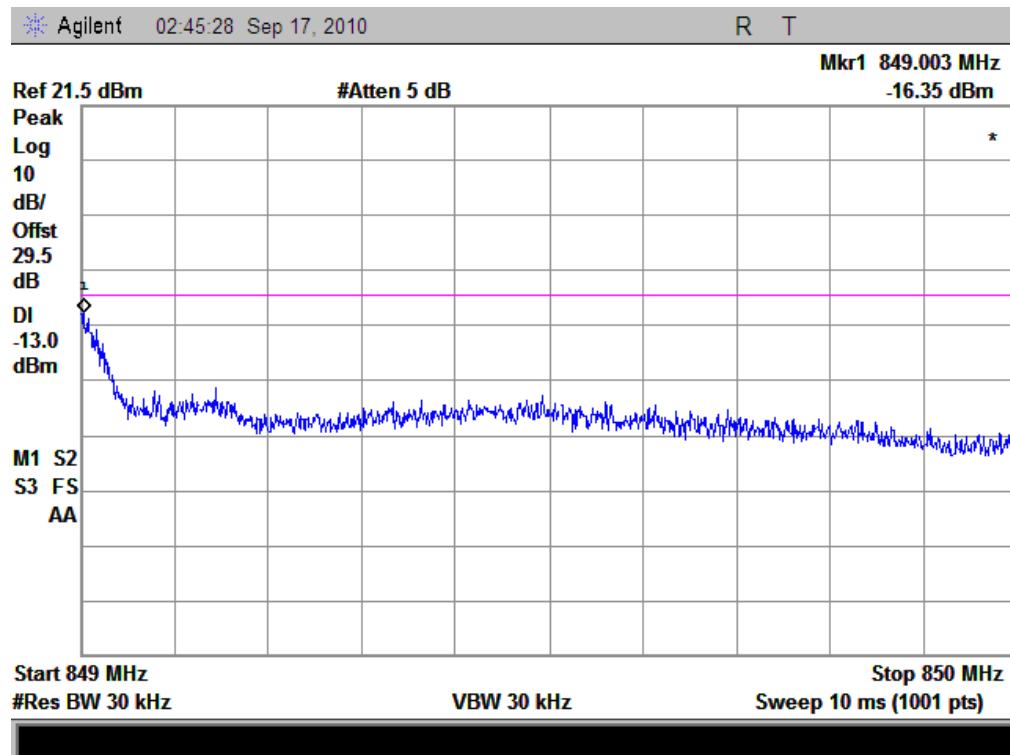
1. Test Verdict:

Band	Channel	Frequency (MHz)	Measured Max. Band Edge Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
CDMA 800MHz	1013	824.7	-13.59	Plot A	-13	PASS
	777	848.31	-16.35	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 Procedure

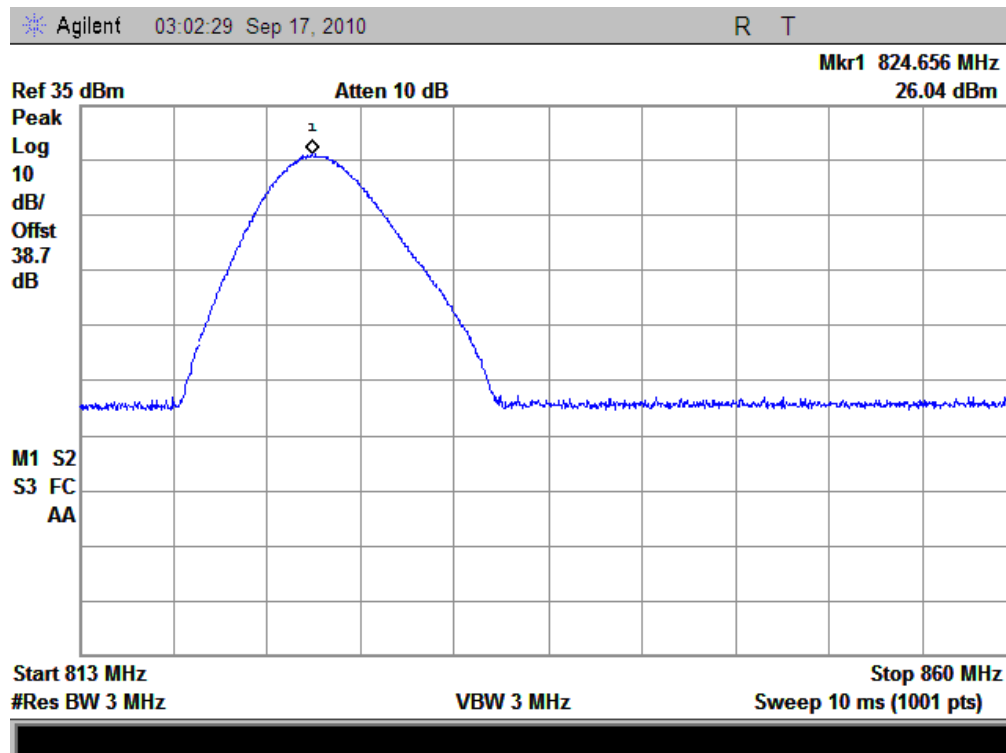
1. Perform test system setup as section 3.1.2.
2. The resolution bandwidth of the Spectrum Analyzer is set to be comparable to the emission bandwidth of the transmitter, e.g. for GSM modulated signal (here used): RBW=VBW=1MHz, for CDMA modulated signal: RBW=VBW=3MHz.
3. The low, middle and the high channels 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.

3.6.3 Test Result

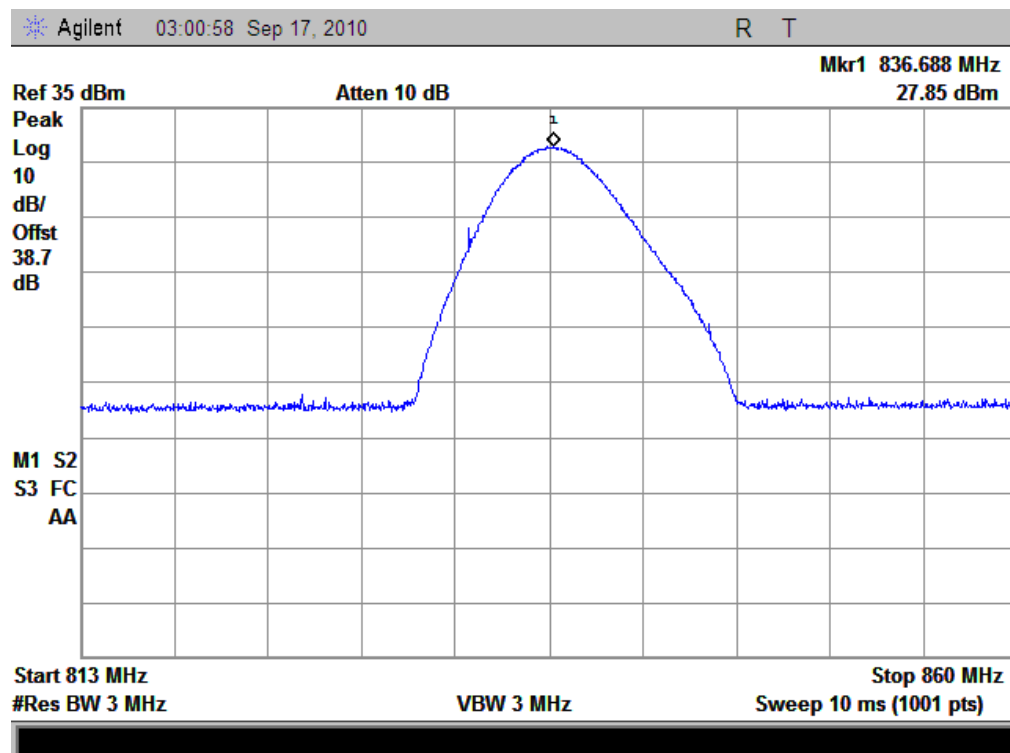
1. Test Verdict:

No.	Channel	Frequency (MHz)	Measured ERP		Limit ERP	
			dBm	W	dBm	W
1	1013	824.7	26.04	0.40	< 38.5	< 7
2	384	836.52	27.85	0.61	< 38.5	< 7
3	777	848.31	28.04	0.64	< 38.5	< 7

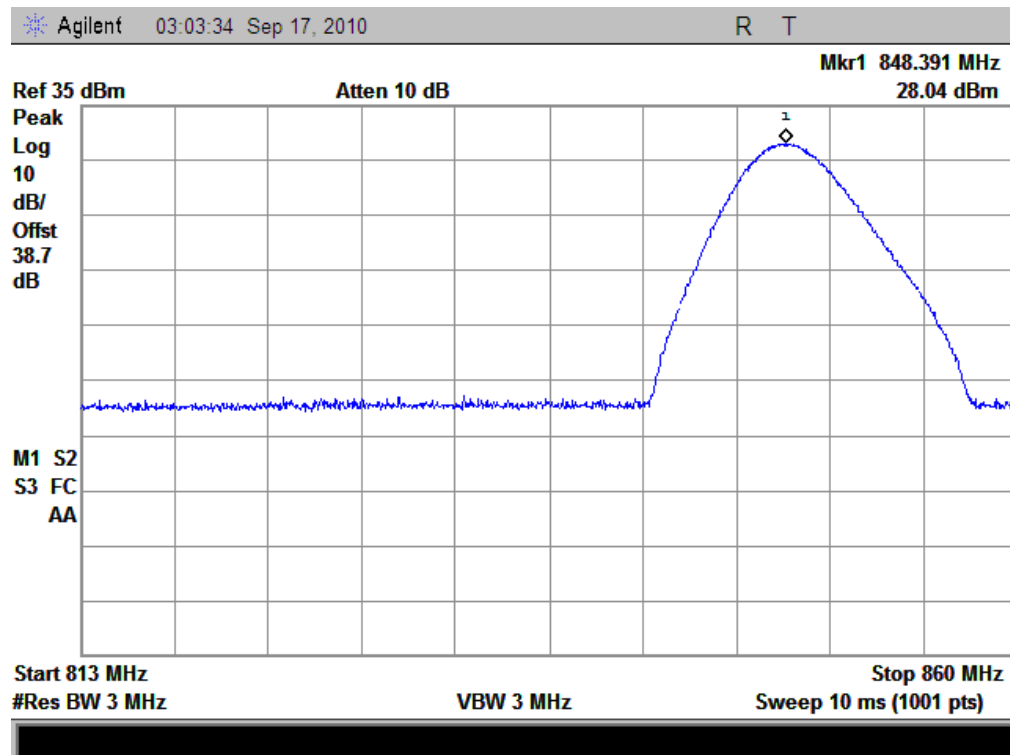
2. The plots:



(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.

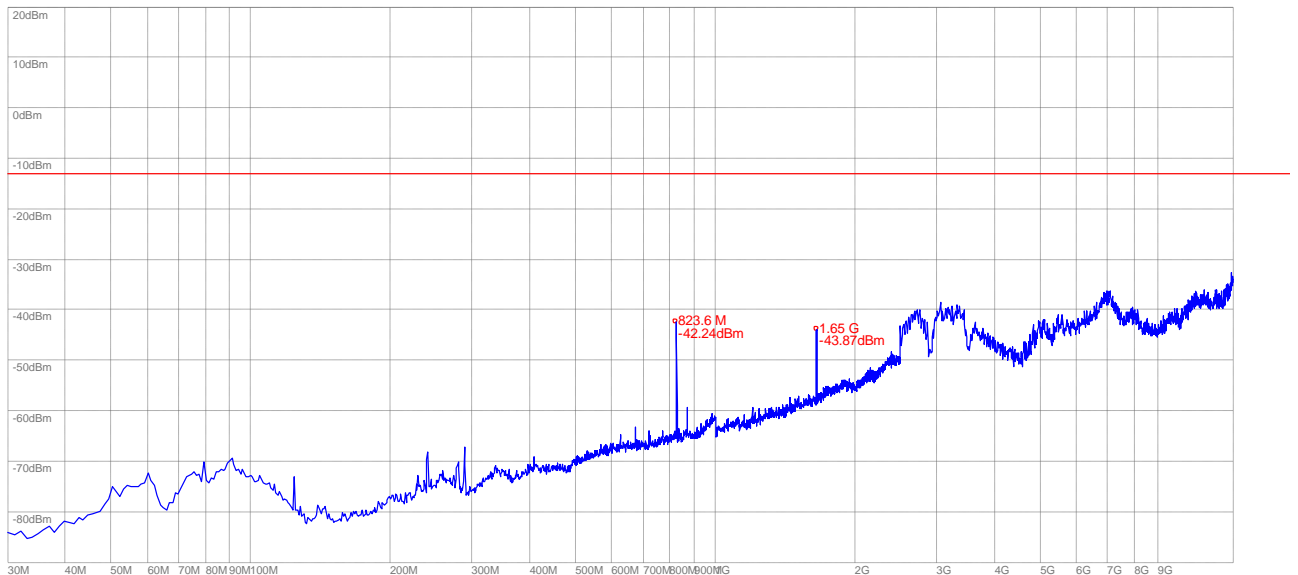
3.7.3 Test Result

1. Test Verdict:

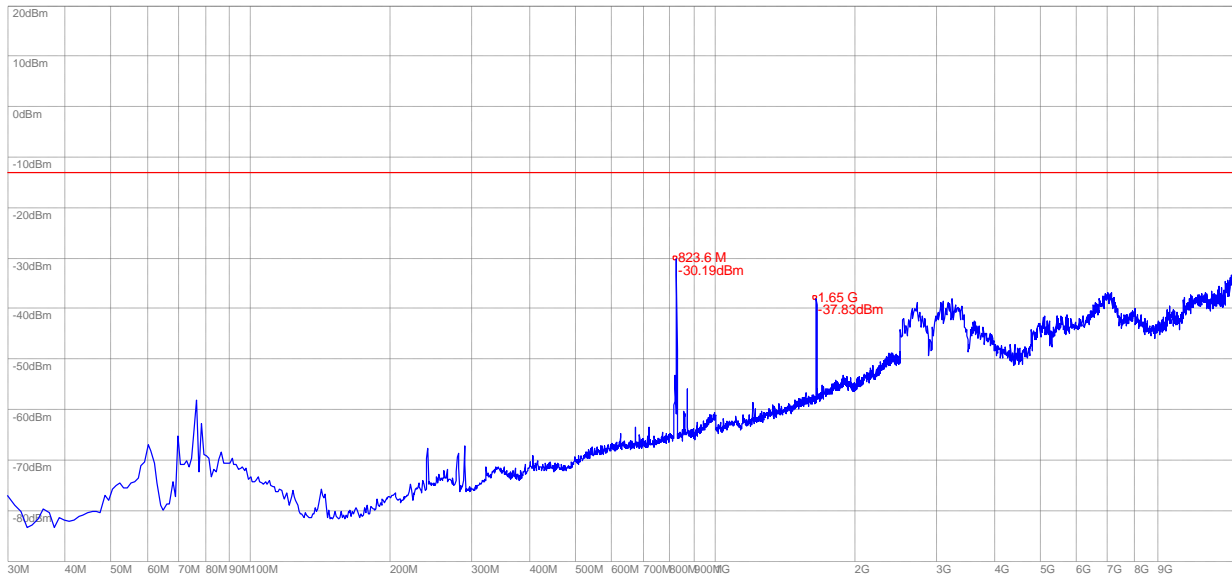
Band	Channel	Frequency (MHz)	Measured Max. Spurious Emission (dBm)		Refer to Plot	Limit (dBm)	Verdict
			Test Antenna Horizontal	Test Antenna Vertical			
CDMA 800MHz	1013	824.7	-43.87	-37.83	Plot A.1/A.2	-13	PASS
	384	836.52	-49.50	-45.83	Plot B.1/B.2		PASS
	777	848.31	-46.95	-43.25	Plot C.1/C.2		PASS

2. Test Plot for the Whole Measurement Frequency Range:

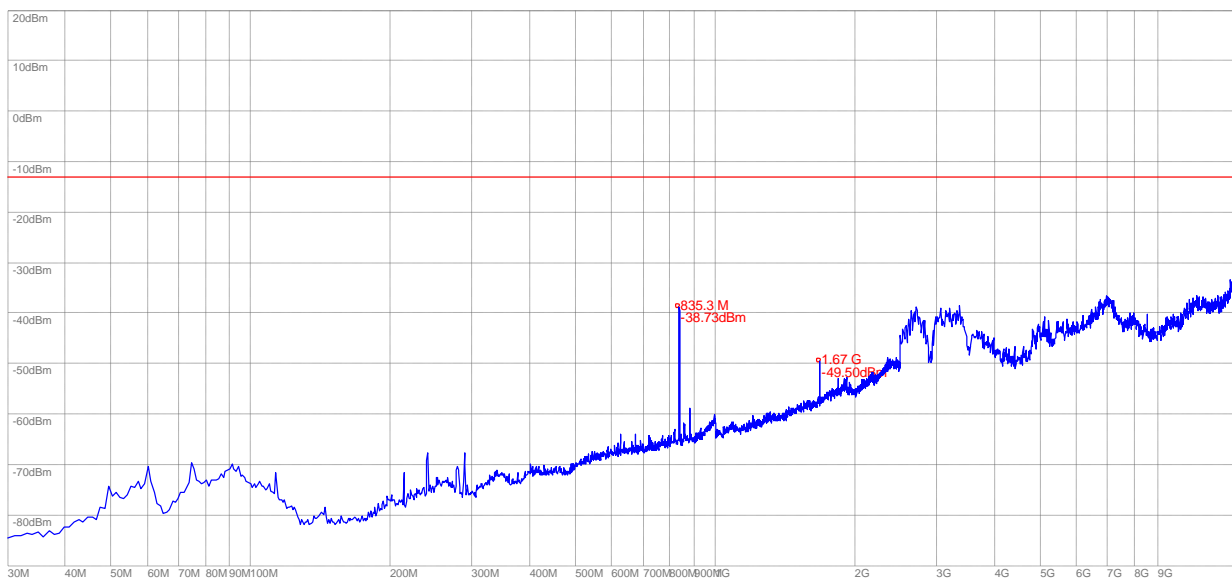
Note: the power of the EUT transmitting frequency should be ignored.



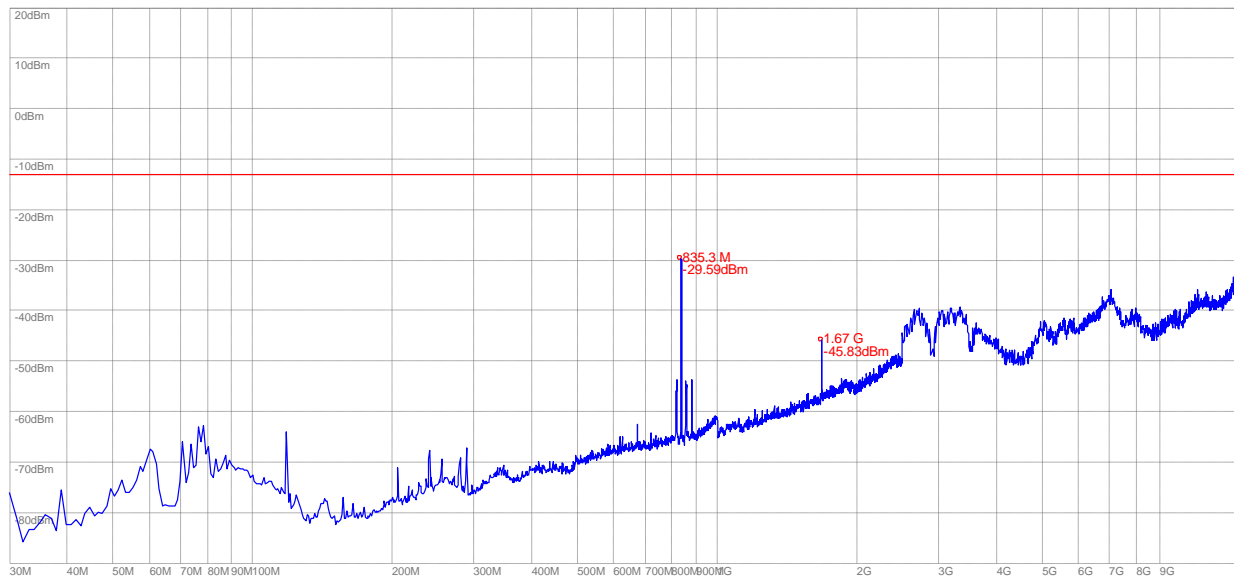
(Plot A.1: Plot when the TCH number set to 1013, Test Antenna Horizontal)



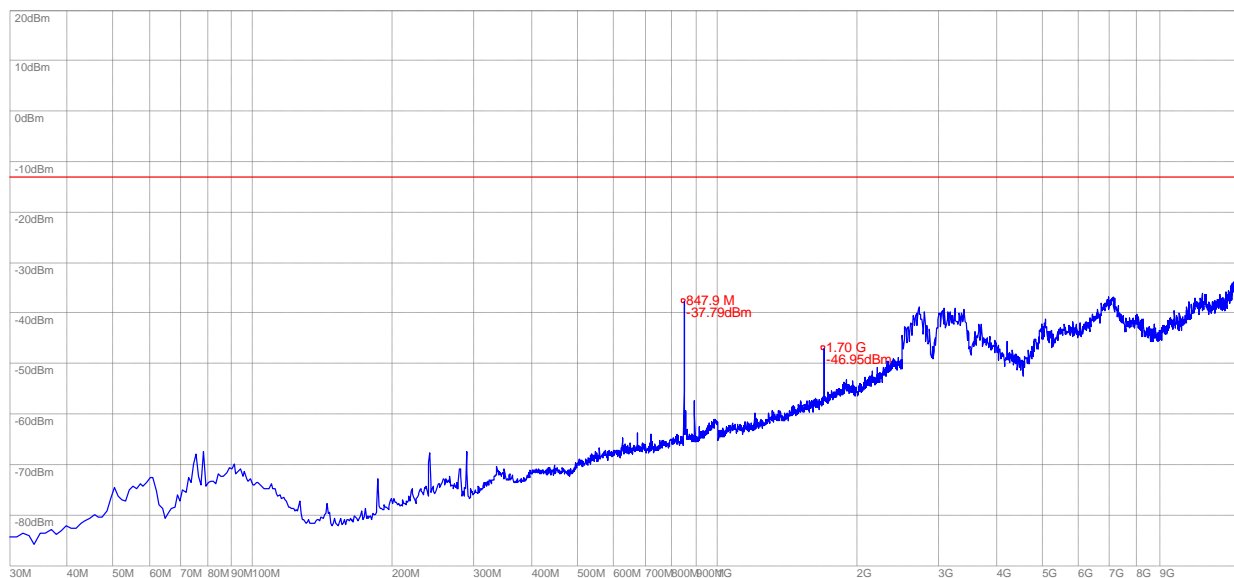
(Plot A.2: Plot when the TCH number set to 1013, Test Antenna Vertical)



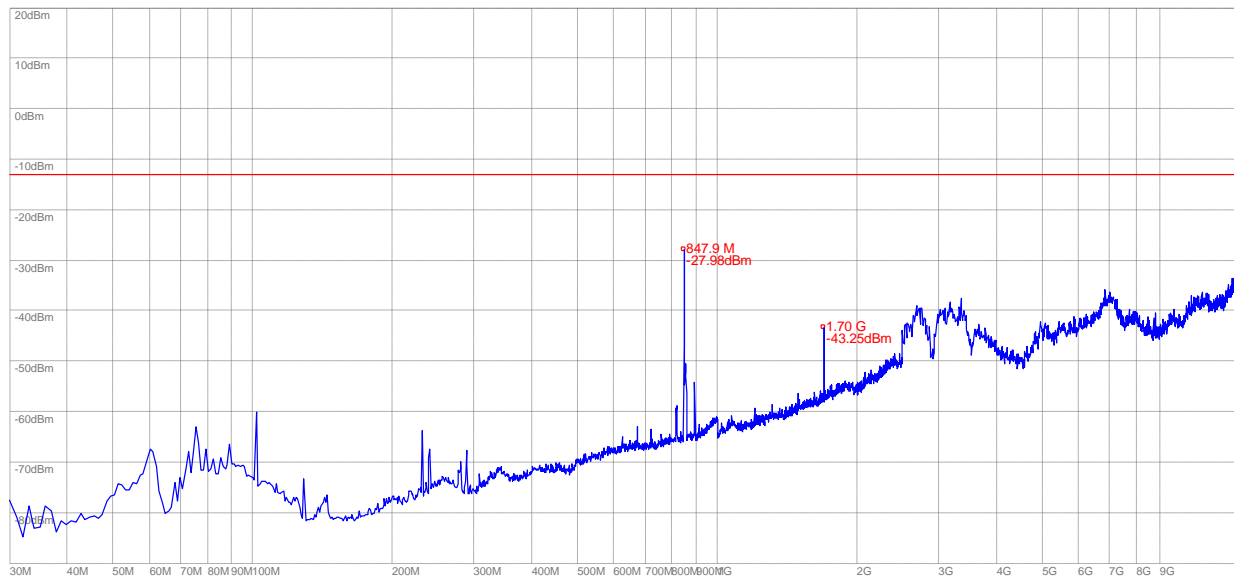
(Plot B.1: Plot when the TCH number set to 384, Test Antenna Horizontal)



(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 °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 3.8V) and the temperature of the Temperature Chamber to vary from -30 °C to +50 °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 °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 °C), then repeat step 3 to 8.

3.8.3 Test Result

No.	Test Conditions		Frequency Deviation at Channels Used						
	Voltage	Temperature	1013		384		777		limits
			Hz	ppm	Hz	ppm	Hz	ppm	
1	3.8V	-30 ℃	13.02	0.011	15.68	0.013	11.25	0.010	±2.5ppm
2		-20 ℃	-11.85	-0.010	-18.75	-0.016	-8.78	-0.007	
3		-10 ℃	19.51	0.016	22.06	0.018	16.77	0.014	
4		0 ℃	20.08	0.017	17.52	0.015	11.02	0.009	
5		+10 ℃	-11.05	-0.009	-10.55	-0.009	-14.55	-0.012	
6		+20 ℃	18.53	0.015	16.08	0.013	9.87	0.008	
7		+30 ℃	9.88	0.008	-8.55	-0.007	12.32	0.010	
8		+40 ℃	16.04	0.013	14.09	0.012	10.44	0.009	
9		+50 ℃	11.35	0.009	-15.66	-0.013	7.82	0.007	
10	4.2V	+22 ℃	11.67	0.010	10.02	0.008	-5.8	-0.005	
11	3.6V	+22 ℃	-9.05	-0.007	-7.88	-0.007	17.85	0.015	
TEST Result: PASS									

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