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# FCC TEST REPORT

*of*

## CDMA 2000 EV-DO Wireless Data Terminal

FCC ID: Q78-AC8700  
Brand Name: ZTE  
Model No.: AC8700  
Serial No.: N.A.  
Report No.: FCC06-8089  
Date: November 16, 2006

*Prepared for*

### ZTE Corporation

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

*Prepared by*

### ShenZhen Electronic Product Quality Testing Center

Electronic Testing Building, Shahe Road, Xili, Nanshan District, ShenZhen, 518055, P.R.China  
Tel: 86 755 26627338 Fax: 86 755 26627238

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# 1 Test Report Certification

**Product:** CDMA 2000 EV-DO Wireless Data Terminal

**FCC ID:** Q78-AC8700

**Model No.:** AC8700

**Applicant:** ZTE Corporation

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

**Manufacturer:** ZTE Corporation

**Manufacturer Address:** 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 Result:** PASS

We, Shenzhen Electronic Product Quality Testing Center, hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Tested by: Lin Xingsun, Date: Nov. 16. 2006  
Lin Xingsun

Checked by: Smart Li, Date: Nov. 17. 2006  
Smart Li



Approved by: 王克勤, Date: Nov. 17, 2006  
Wang Keqin

## 2 General Information

### 2.1 Description of EUT

<b>Description:</b>	CDMA 2000 EV-DO Wireless Data Terminal
<b>Model No.:</b>	AC8700
<b>Emission Designator:</b>	1M25F9W
<b>Modulation:</b>	CDMA (EV-DO)
<b>Frequency:</b>	Tx: 824.70-848.31MHz; Rx: 869.70-893.31MHz
<b>Rated Power:</b>	N.A.
<b>Serial No.:</b>	N.A.
<b>Hardware Version:</b>	060800
<b>Software Version:</b>	V0.17
<b>Power supply:</b>	5V (USB port)

**NOTE:**

1. The EUT is a model of CDMA (EV-DO) Mobile Station (“MS” for short in this report) operating in Cellular 800MHz band.
2. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User’s Manual.

### 2.2 Objective

Perform EMC test according to FCC rules Part 2 and Part 22 for FCC ID Certification.



## 2.3 Test Standards and Results

The EUT has been tested according to 47 CFR

- Part 2 Frequency Allocations and Radio Treaty Matters: General Rules and Regulations (10-1-05 Edition)
- Part 22 Public Mobile Services (10-1-05 Edition)

Test items and the results are as bellow:

<b>№</b>	<b>FCC Rules</b>	<b>Test Type</b>	<b>Result</b>	<b>Test Date</b>
1	§2.106 §22.905	Frequencies	PASS	2006.11.7
2	§2.1046	Conducted RF Output Power at Antenna Terminal	PASS	2006.11.7
3	§2.1049	Occupied Bandwidth	PASS	2006.11.7
4	§2.1051 §2.1057 §22.917	Conducted Spurious Emission at Antenna Terminal	PASS	2006.11.7
5	§22.913	Transmitter Radiated Power (EIRP/ERP)	PASS	2006.11.13
6	§2.1053 §2.1057 §22.917	Radiated Spurious Emission	PASS	2006.11.13
7	§2.1055 §22.355	Frequency Stability	PASS	2006.11.14

## 2.4 List of Equipments Used

Description	Manufacturer	Model No.	Cal. Due Date	Serial No.
Test Receiver	Rohde & Schwarz	ESIB26	2007.06.05	A0304218
Loop Antenna	Rohde & Schwarz	HFH2-Z2	2007.06.05	A0304220
Ultra Broadband Ant.	Rohde & Schwarz	HL562	2007.06.05	A0304224
Horn Ant.	Rohde & Schwarz	HF906	2007.06.05	100150
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	2007.06.05	A0304212
Mobile Phone Tester	Willtek	4403	2007.02.10	0811211
3G Communication Antenna	European Antennas	PSA 75301R/170	2007.05.10	A0304213
Temperature Chamber	JAPAN TABAI	PSL-4G	2007.02.05	A8708056
Regulated DC Power Supply	Jiangbo	JB-305	--	A0412374
Shield Room	Nanbo Tech	Site 1	2007.01.17	A0304188
Anechoic Chamber	Albatross	EMC12.8×6.8×6.4(m)	2007.04.10	A0304210

## 2.5 Test Facility

Shenzhen Electronic Product Quality Testing Center (SET) is a third party testing organization accredited by China National Accreditation Committee for Laboratories (CNACL) according to ISO/IEC 17025. The accreditation certificate number is **L1659**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)), and the radiated and conducted Emission test equipments of SET are constructed and calibrated to meet the FCC requirements ANSI C63.4:2001 and CISPR 22/EN 55022. The FCC Registration Number is **261302**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)) also complies with Canada standard RSS 212, and acceptable to Industry Canada for the performance of radiated measurements. The Industry Canada Registration Number is **IC 5915**.

## 2.6 Environmental conditions

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

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

### 3 Frequencies

#### 3.1 Frequency Blocks Available for Cellular Service

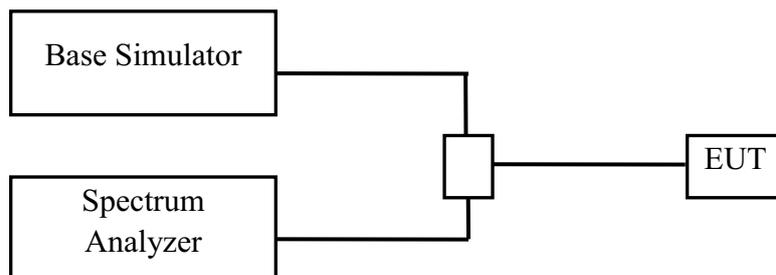
According to FCC §22.905, the frequencies blocks assignment for the Cellular Radiotelephone Service are listed as bellow.

- Block A: Mobile 824-835 MHz, Base 869-880 MHz;  
Mobile 845-846.5 MHz, Base 891.5-894 MHz;
- Block B: Mobile 835-845 MHz, Base 880-890 MHz;  
Mobile 846.5-849 MHz, Base 891.5-894 MHz.

#### 3.2 Test Procedure

- The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth of the fundamental emission of the transmitter. For GSM signal, VBW=RBW=3 kHz; for CDMA signal, VBW=RBW=30 kHz.

#### 3.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

#### 3.4 EUT Setup and Operating Conditions

The EUT was connected to USB port of a notebook computer (Lenovo, 2668).

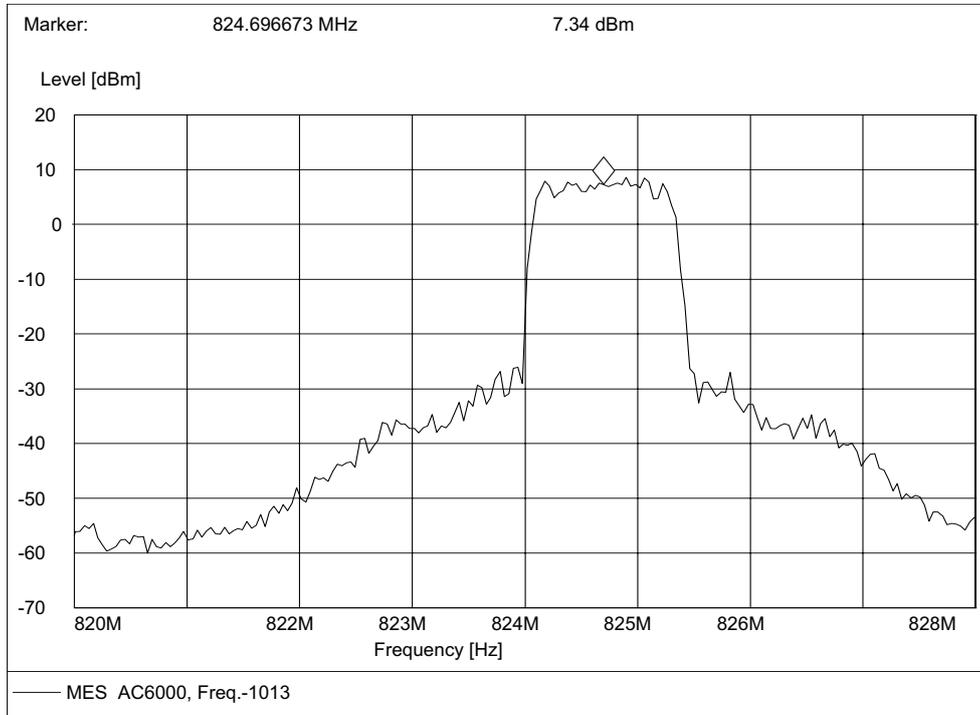
A communication link was established between the MS and a System Simulator (SS). The MS operated at CMDA (EV-DO) data mode and the maximum output power. The CDMA (Cellular band) channel No.1013 (lowest) and 777 (highest) were measured respectively.



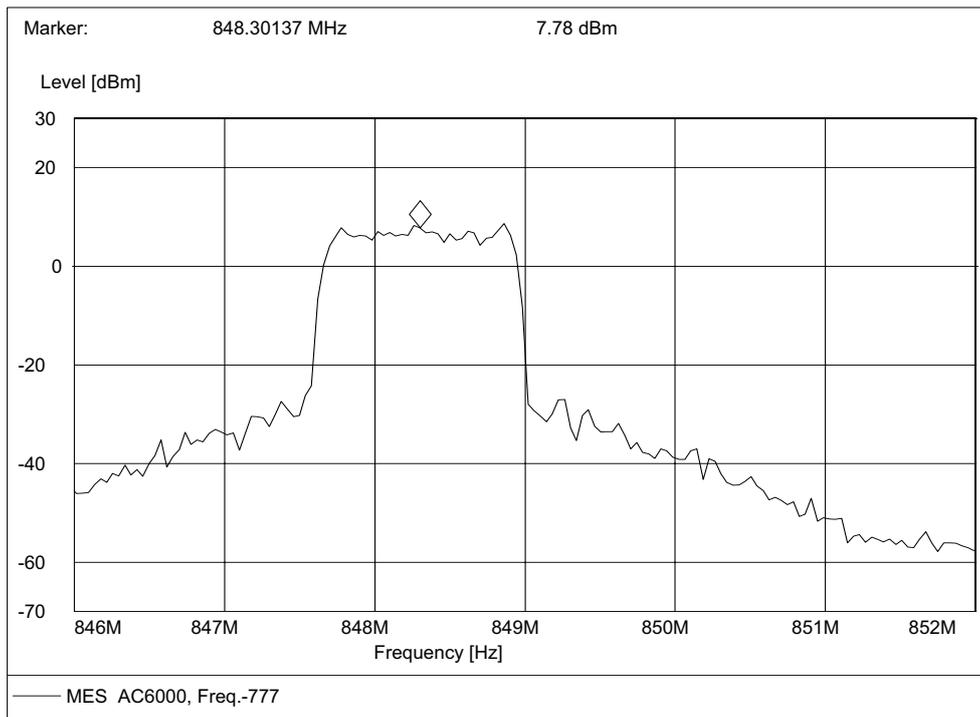
### 3.5 Test Results

The frequencies of the lowest channel and the highest channel are as the following figures.

#### 1. Lowest channel No.1013



#### 2. Highest channel No.777



## 4 Conducted RF Output Power Test

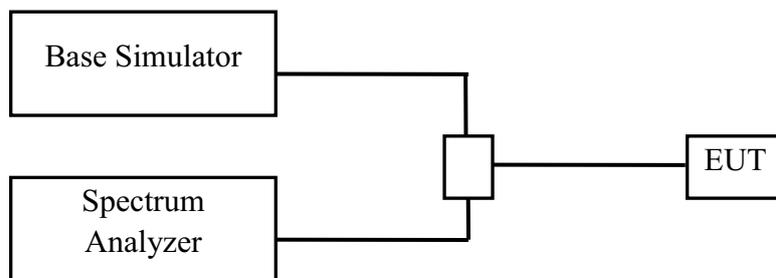
### 4.1 RF Power Output Test Requirement

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.

### 4.2 Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. The resolution bandwidth of the spectrum analyzer was comparable to the emission bandwidth. For GSM signal, VBW=RBW=1 MHz; for CDMA signal, VBW=RBW=3 MHz.

### 4.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

### 4.4 EUT Setup and Operating Conditions

The EUT was connected to USB port of a notebook computer (Lenovo, 2668).

A communication link was established between the MS and a System Simulator (SS). The MS operated at CMDA (EV-DO) data mode and the maximum output power. The CDMA (Cellular band) channel No.1013 (lowest), 384 (middle) and 777 (highest) were measured respectively.

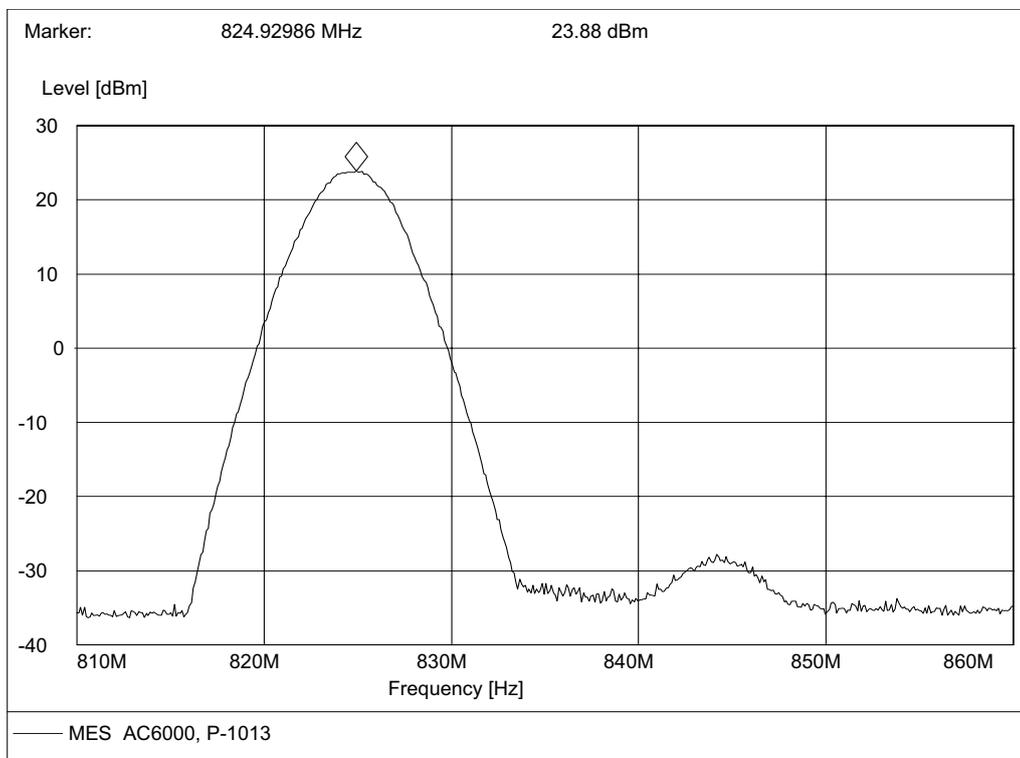


### 4.5 Test Results

No.	CDMA 1X Channel No.	Frequency (MHz)	Measured Power		Rated Power (dBm)
			(dBm)	(W)	
1	1013	824.70	23.88	0.244	N.A.
2	384	836.52	23.78	0.239	N.A.
3	777	848.31	24.53	0.284	N.A.

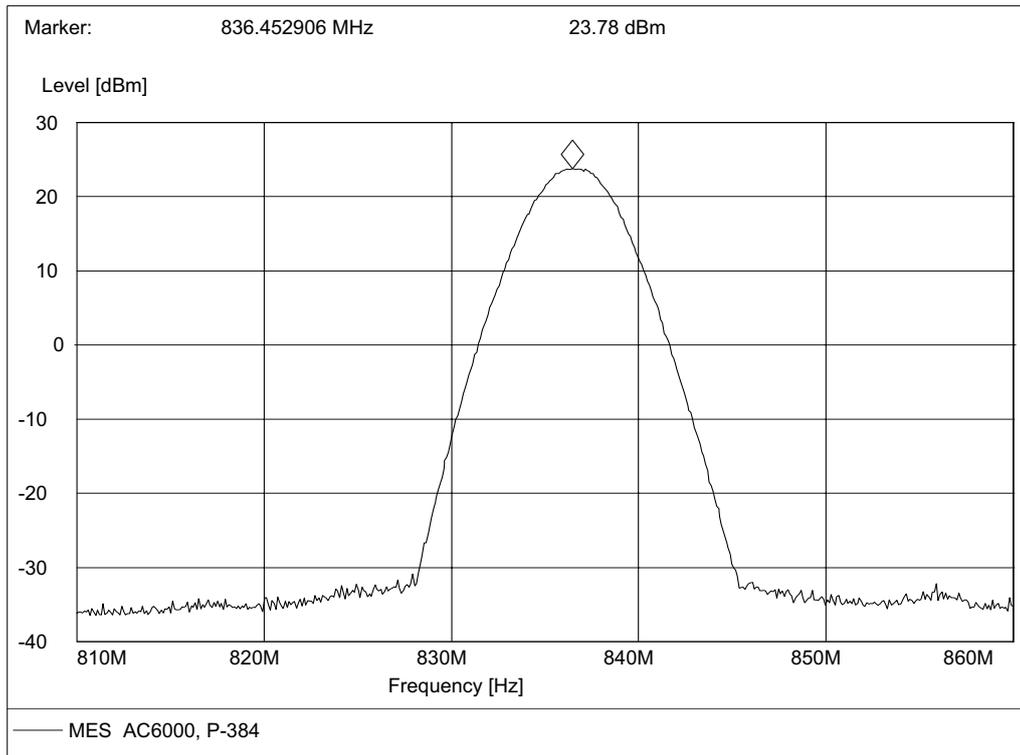
#### Test Plots

##### 1. Lowest channel No.1013

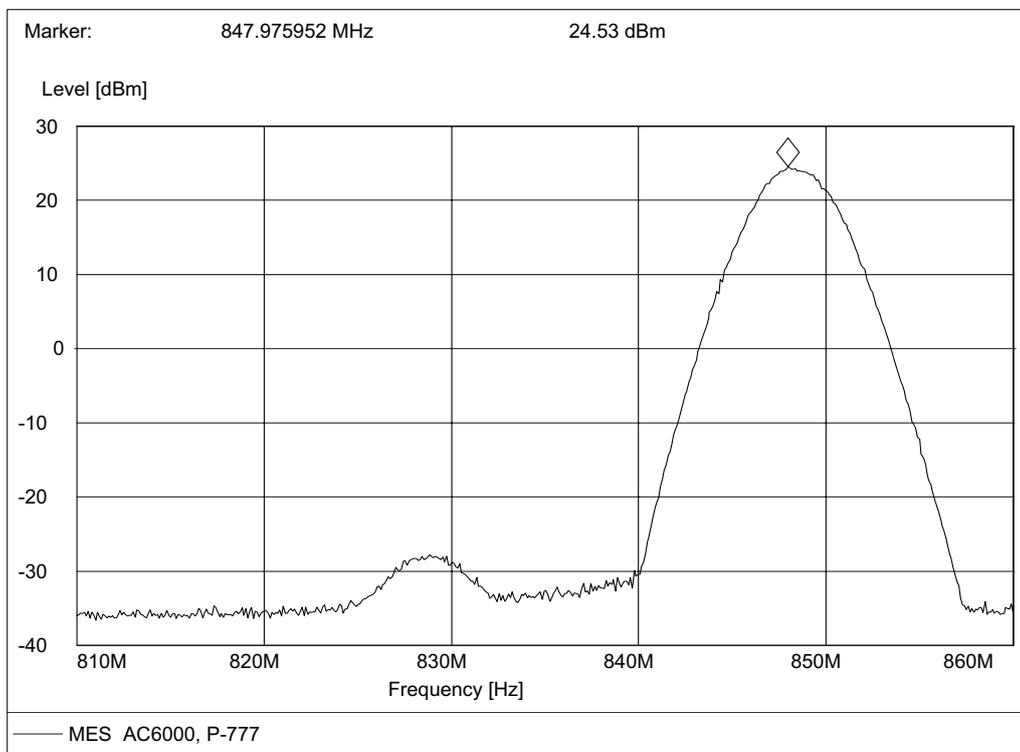




### 2. Middle channel No.384



### 3. Highest channel No.777



## 5 Occupied Bandwidth Test

### 5.1 Definition

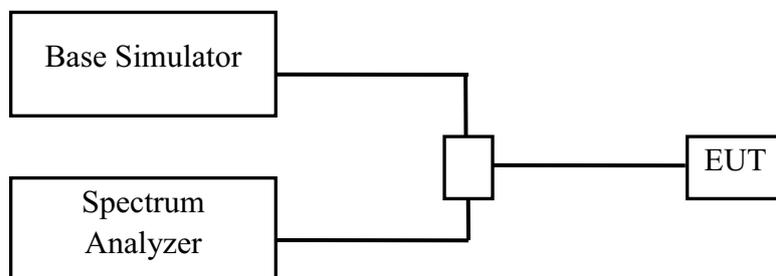
According to FCC §2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as the 99% emission bandwidth, or 20dB bandwidth ( $10\log 1\%=20\text{dB}$ ) taking the total RF output power as reference.

### 5.2 Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The loss of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. The resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth. For GSM signal,  $\text{VBW}=\text{RBW}=3\text{ kHz}$ ; for CDMA signal,  $\text{VBW}=\text{RBW}=30\text{ kHz}$ .

### 5.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

### 5.4 EUT Setup and Operating Conditions

The EUT was connected to USB port of a notebook computer (Lenovo, 2668).

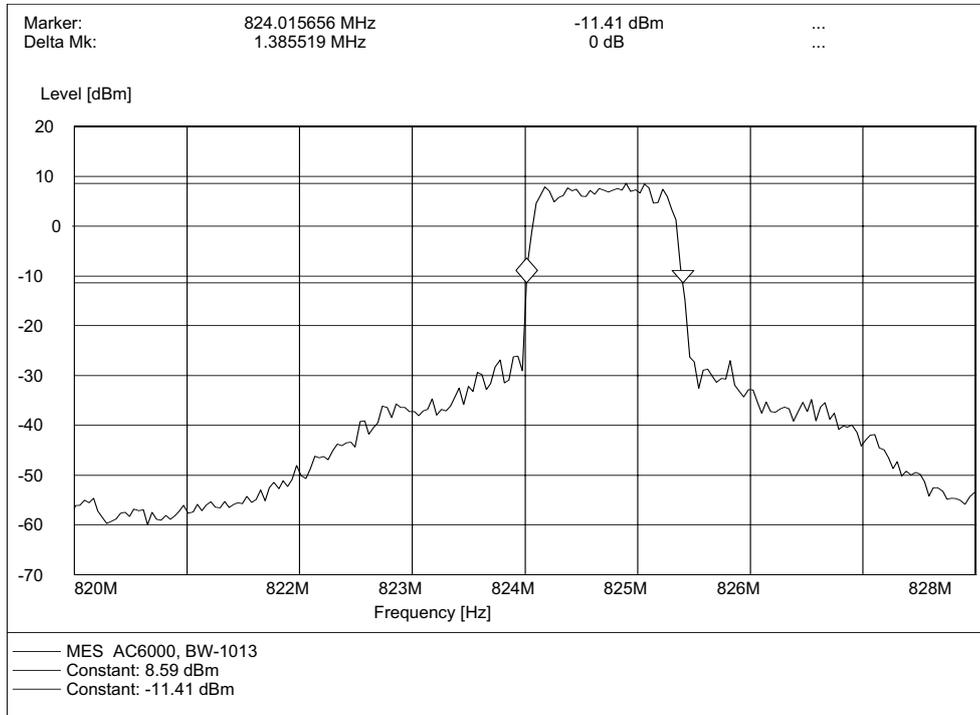
A communication link was established between the MS and a System Simulator (SS). The MS operated at CMDA (EV-DO) data mode and the maximum output power. The CDMA (Cellular band) channel No.1013 (lowest), 384 (middle) and 777 (highest) were measured respectively.



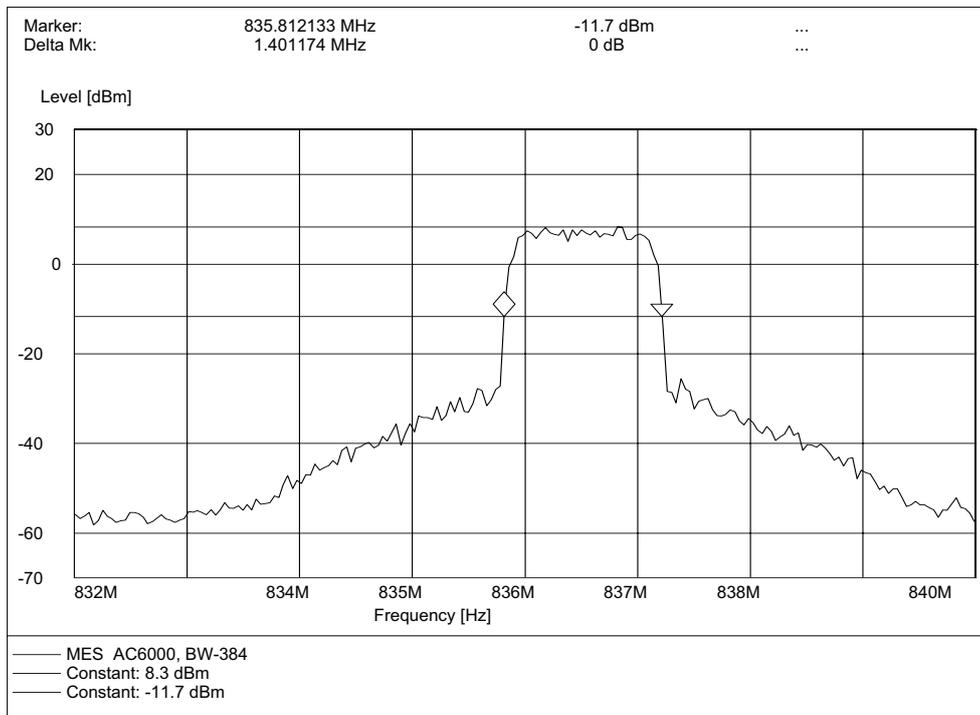
## 5.5 Test Results

The occupied bandwidth was measured to be about 1.4MHz. Refer to the following plots.

### 1. Lowest channel No.1013

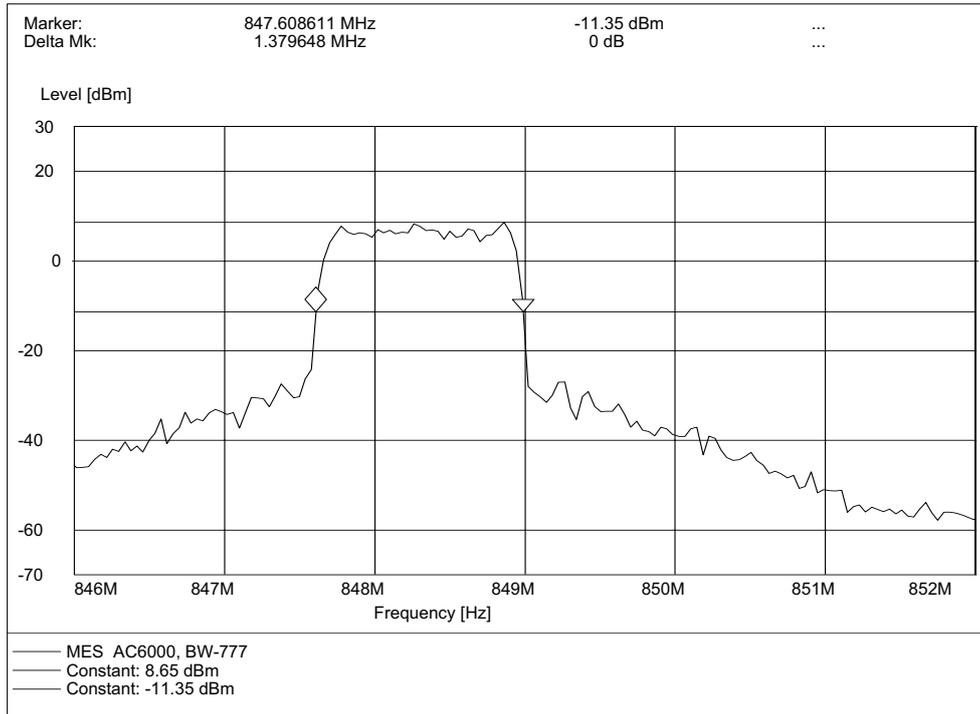


### 2. Middle channel No.384





### 3. Highest channel No.777



## 6 Conducted Spurious Emission Test

### 6.1 Limits of Conducted Spurious Emission

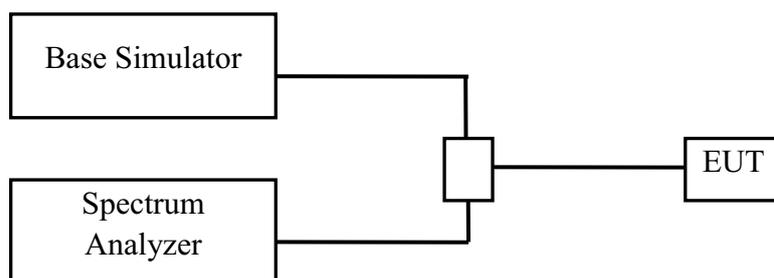
According to FCC §22.917 (a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB. This calculated to be -13dBm.

According to FCC §22.917 (b), in the 1 MHz 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-edges

### 6.2 Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 9 kHz to 10th harmonic of the fundamental frequency.
- c. In the 1 MHz bands immediately outside and adjacent to the frequency block, the resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth of the fundamental emission of the transmitter. For GSM signal, the resolution bandwidth was 3 kHz; for CDMA signal, the resolution bandwidth was 30 kHz.

### 6.3 Test Setup



### 6.4 EUT Setup and Operating Conditions

The EUT was connected to USB port of a notebook computer (Lenovo, 2668).

A communication link was established between the MS and a System Simulator (SS). The MS operated at CMDA (EV-DO) data mode and the maximum output power. The CDMA (Cellular band) channel No.1013 (lowest), 384 (middle) and 777 (highest) were measured respectively.

## 6.5 Test Results

No.	Frequency (MHz)	Emission Power (dBm)	Limit (dBm)
<b>Channel No. 1013 (824.70 MHz)</b>			
1	1649.40	-48.47	-13
2	2474.10	-58.39	-13
3	3298.80	-42.71	-13
4	4123.50	-33.05	-13
5	4948.20	--	-13
6	5772.90	--	-13
7	6597.60	--	-13
8	7422.30	--	-13
9	8247.00	--	-13
<b>Channel No. 384 (836.52 MHz)</b>			
10	1673.04	-49.73	-13
11	2509.56	-55.22	-13
12	3346.08	-41.73	-13
13	4182.60	-32.59	-13
14	5019.12	-49.51	-13
15	5855.64	--	-13
16	6692.16	--	-13
17	7528.68	--	-13
18	8365.20	--	-13
<b>Channel No. 777 (848.31 MHz)</b>			
19	1696.62	-53.09	-13
20	2544.93	-52.83	-13
21	3393.24	-38.79	-13
22	4241.55	-29.81	-13
23	5089.86	-42.23	-13
24	5938.17	-45.41	-13
25	6786.48	--	-13
26	7634.79	--	-13
27	8483.10	--	-13

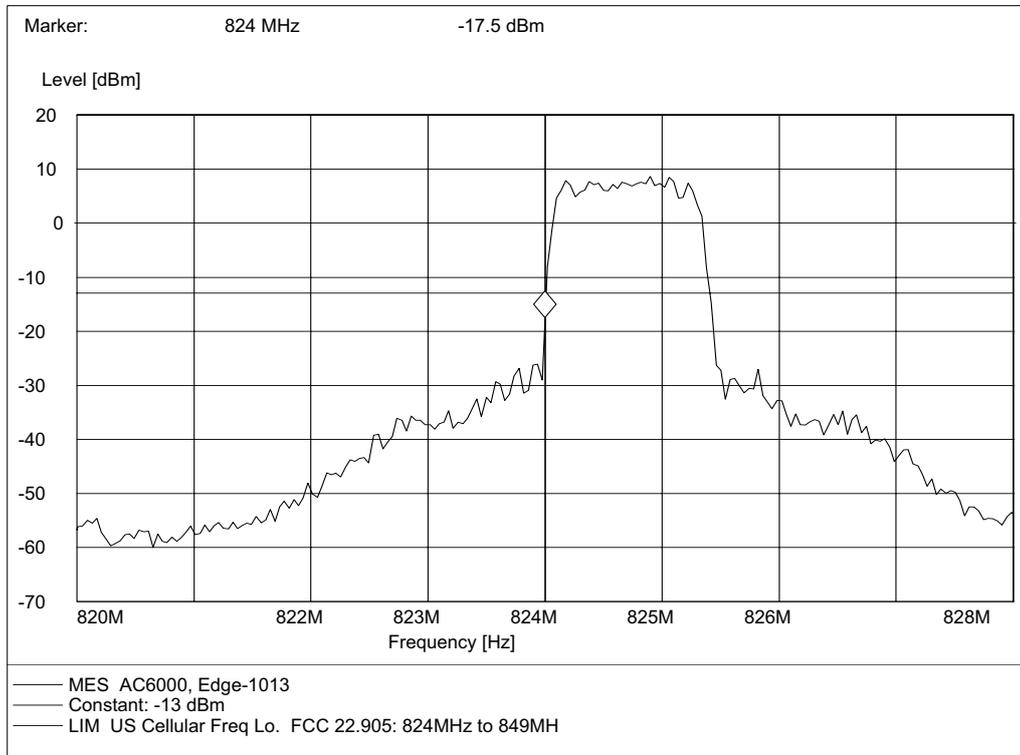
**NOTE:**

1. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
2. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

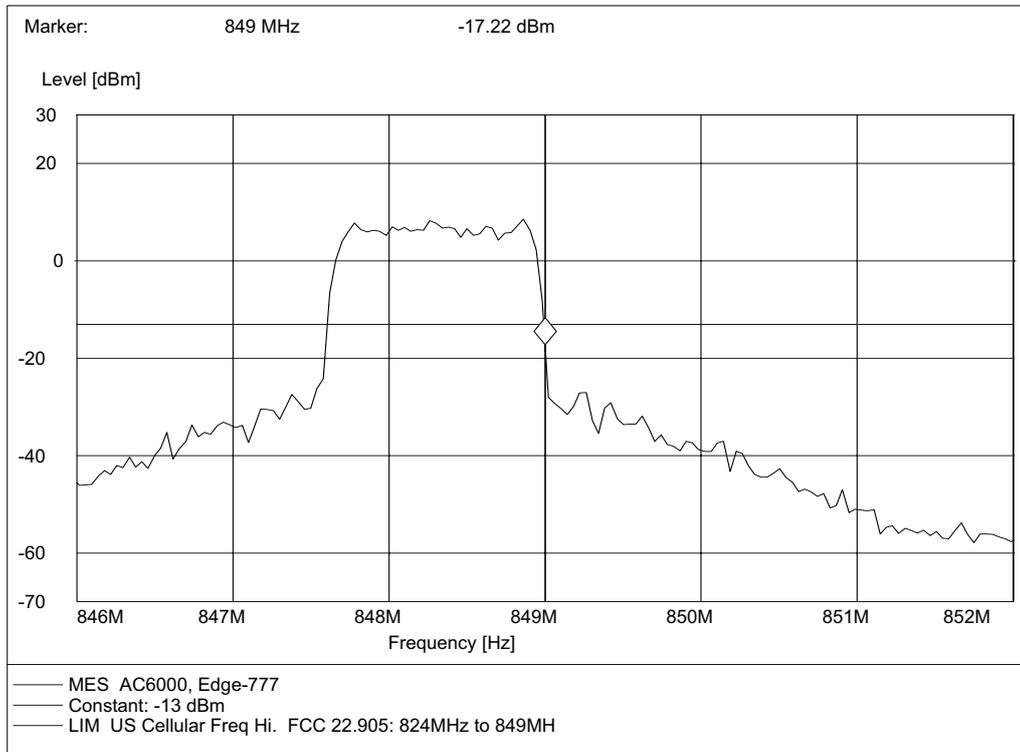


### Plot of Band Edge

#### 1. Lowest channel No.1013



#### 2. Highest channel No.777

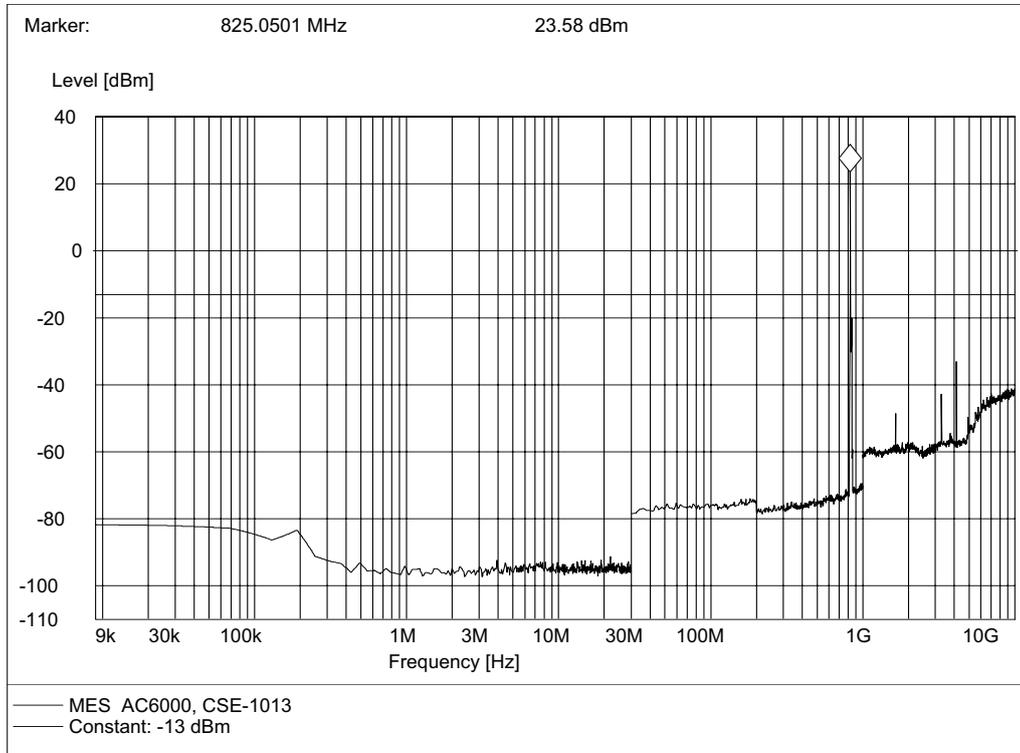




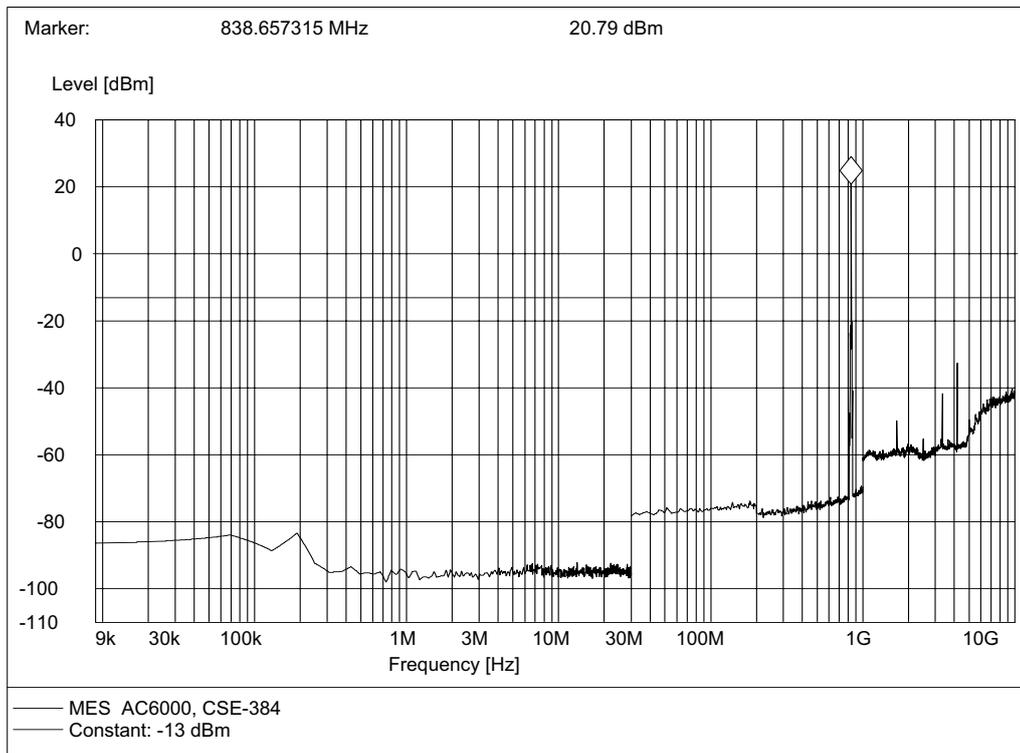
### Plot of Spurious Emission

(Note: The marker point is the MS transmitting frequency which should be ignored.)

#### 1. Lowest channel No.1013

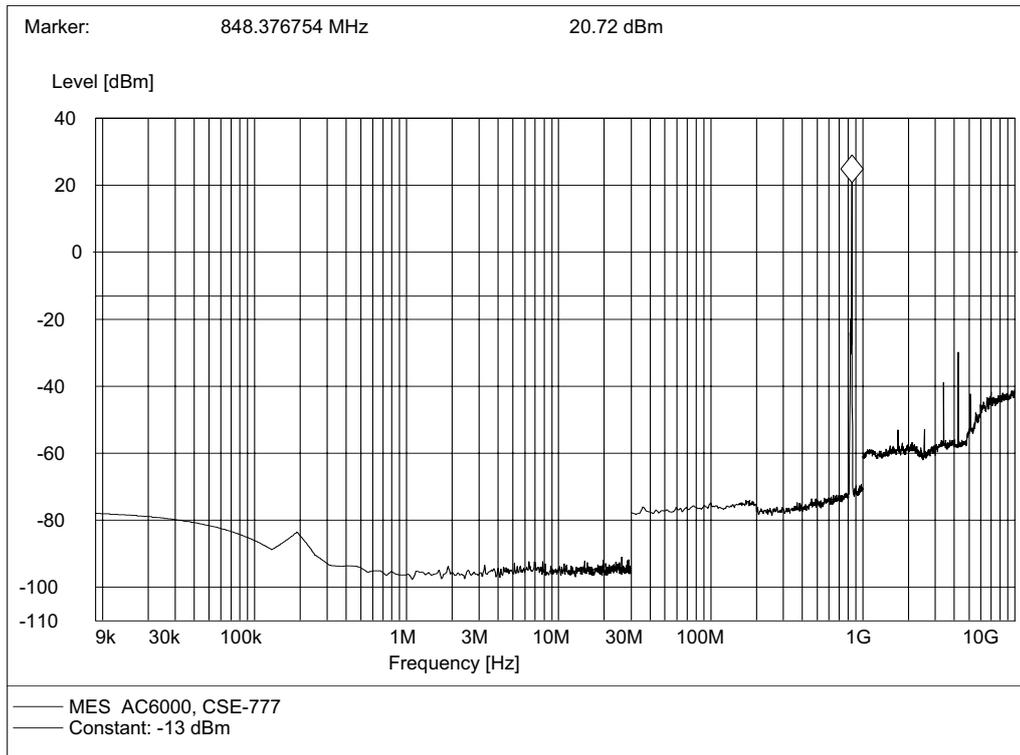


#### 2. Middle channel No.384





### 3. Highest channel No.777



## 7 Transmitter Radiated Power (EIRP/ERP) Test

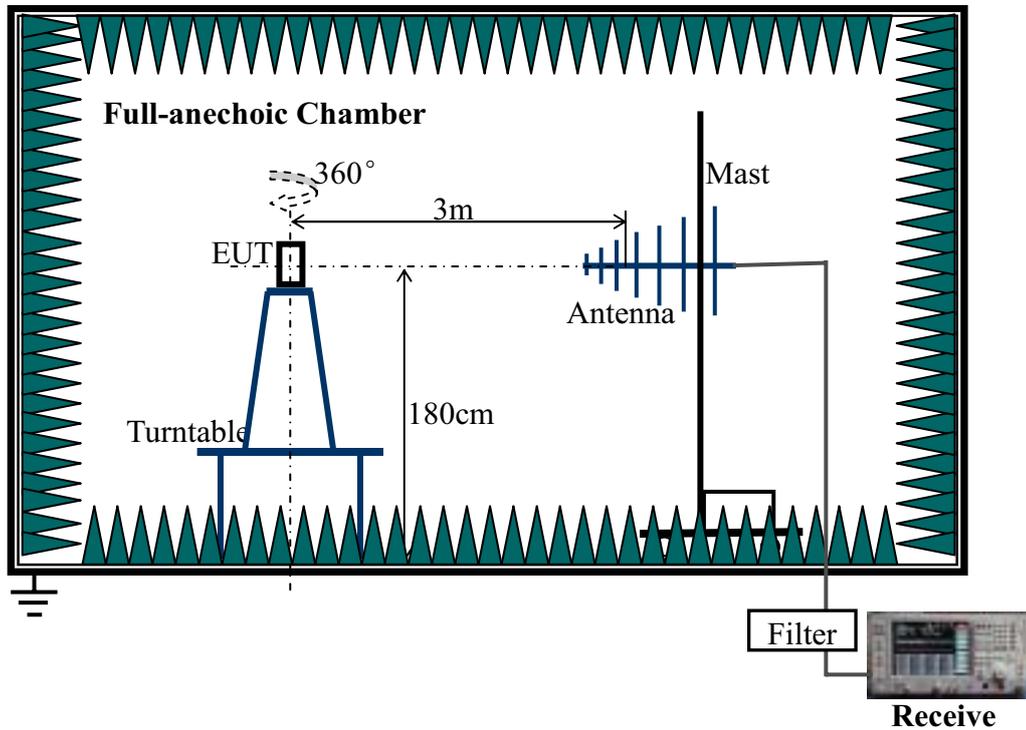
### 7.1 Limits of EIRP/ERP

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

### 7.2 Test Procedure

- a. The radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.
- b. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.
- d. In the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. In the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since the there was no reflection from the chamber floor and the site was pre-calibrated, the antenna height need not to be changed as the open site method. The polarization of the receiving antenna was the same as that of the EUT transmitting antenna.
- c. The spectrum analyzer was set to Maxpeak Detector and Maximum Hold mode. The resolution bandwidth was comparable to the emission bandwidth. For GSM signal, VBW=RBW=1MHz; for CDMA signal, VBW=RBW=3MHz.

### 7.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

### 7.4 EUT Setup and Operating Conditions

The EUT was connected to USB port of a notebook computer (Lenovo, 2668).

A communication link was established between the MS and a System Simulator (SS).

The MS operated at CDMA (EV-DO) data mode and the maximum output power. The CDMA (Cellular band) channel No.1013 (lowest), 384 (middle) and 777 (highest) were measured respectively.

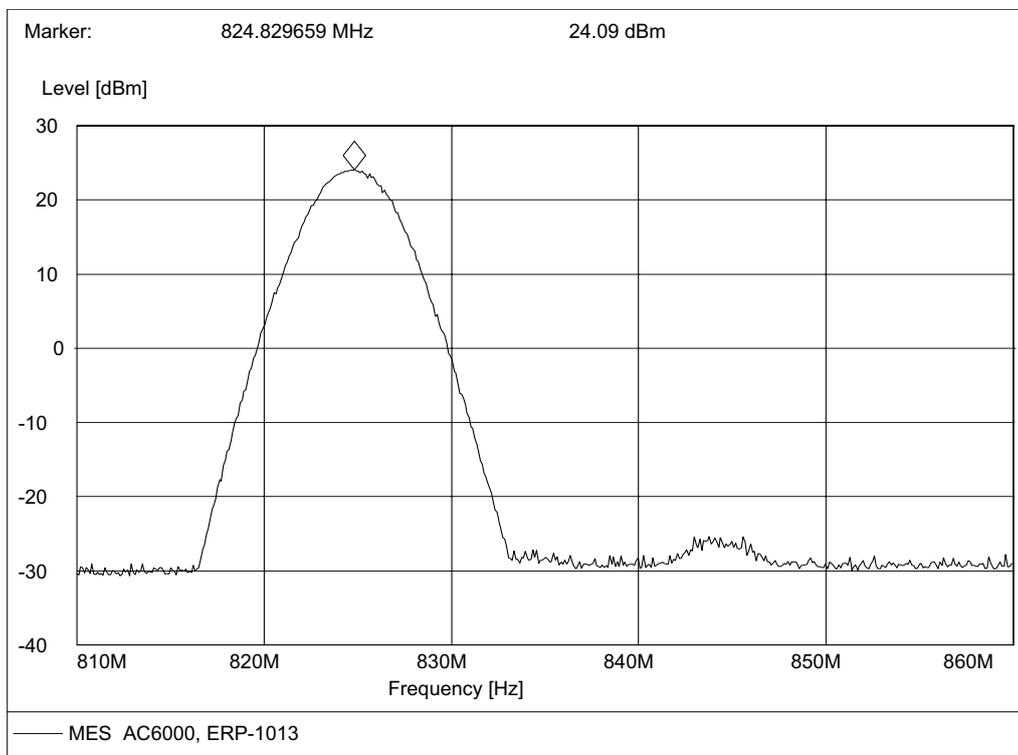


### 7.5 Test Results

No.	CDMA 1X Channel No.	Frequency (MHz)	ERP (dBm)	ERP (W)	Limit ERP (W)
1	1013	824.70	24.09	0.256	7
2	384	836.52	23.57	0.228	7
3	777	848.31	23.44	0.221	7

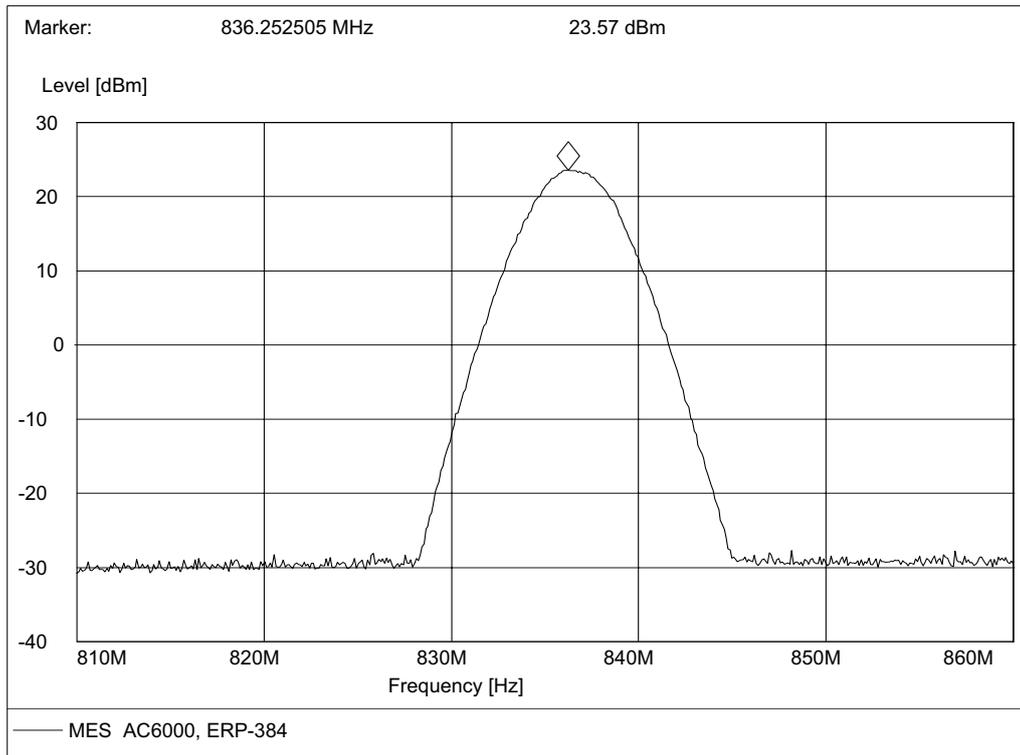
#### Test Plots

##### 1. Lowest channel No.1013

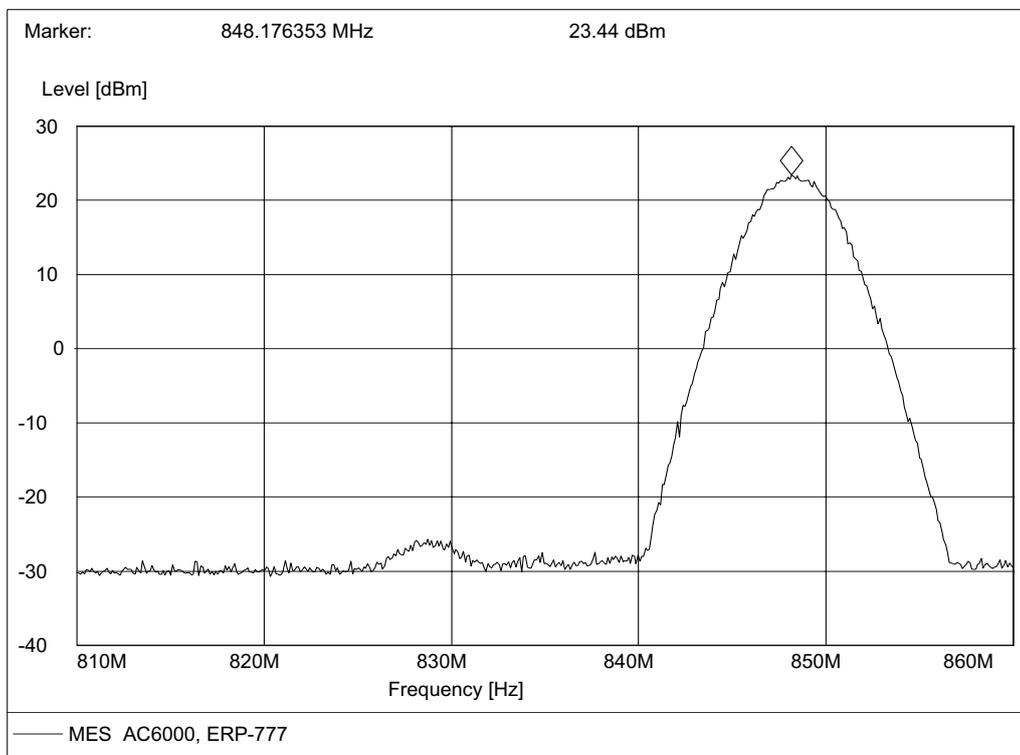




### 2. Middle channel No.384



### 3. Highest channel No.777



## 8 Radiated Spurious Emission Test

### 8.1 Limits of Radiated Spurious Emission

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.

### 8.2 Test Procedure

- a. In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop antenna. The antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.
- b. In the frequency range above 30MHz, the radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.
- c. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.
- d. In the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. In the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since the there was no reflection from the chamber floor and the site was pre-calibrated, the antenna height need not to be changed as the open site method. The measurement was performed with the antenna at horizontal and vertical polarization respectively.
- e. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 30 MHz to 10th harmonic of the fundamental frequency.

### 8.3 Test Setup

Same as 9.3

### 8.4 EUT Setup and Operating Conditions

The EUT was connected to USB port of a notebook computer (Lenovo, 2668).

A communication link was established between the MS and a System Simulator (SS). The MS operated at CMDA (EV-DO) data mode and the maximum output power. The CDMA (Cellular band) channel No.1013 (lowest), 384 (middle) and 777 (highest) were measured respectively.

## 8.5 Test Results

No.	Frequency (MHz)	ERP (dBm)		Limit (dBm)
		Antenna: <u>V</u> ertical	Antenna: <u>H</u> orizontal	
<b>Channel No. 9 (824.70 MHz)</b>				
1	1649.40	-37.73	-37.28	-13
2	2474.10	-46.04	-46.03	-13
3	3298.80	-48.01	-52.24	-13
4	4123.50	-35.94	-46.01	-13
5	4948.20	-47.57	--	-13
6	5772.90	--	--	-13
7	6597.60	--	--	-13
8	7422.30	--	--	-13
9	8247.00	--	--	-13
<b>Channel No. 384 (836.52 MHz)</b>				
10	1673.04	-43.17	-42.52	-13
11	2509.56	-46.15	-46.02	-13
12	3346.08	-50.93	-51.89	-13
13	4182.60	-42.19	-42.24	-13
14	5019.12	--	--	-13
15	5855.64	--	--	-13
16	6692.16	--	--	-13
17	7528.68	--	--	-13
18	8365.20	--	--	-13
<b>Channel No. 777 (848.31 MHz)</b>				
19	1696.62	-37.43	-36.12	-13
20	2544.93	-45.69	-46.04	-13
21	3393.24	-48.06	-47.65	-13
22	4241.55	-36.68	-34.09	-13
23	5089.86	-46.78	-44.78	-13
24	5938.17	--	-45.07	-13
25	6786.48	--	--	-13
26	7634.79	--	--	-13
27	8483.10	--	--	-13

**NOTE:**

1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

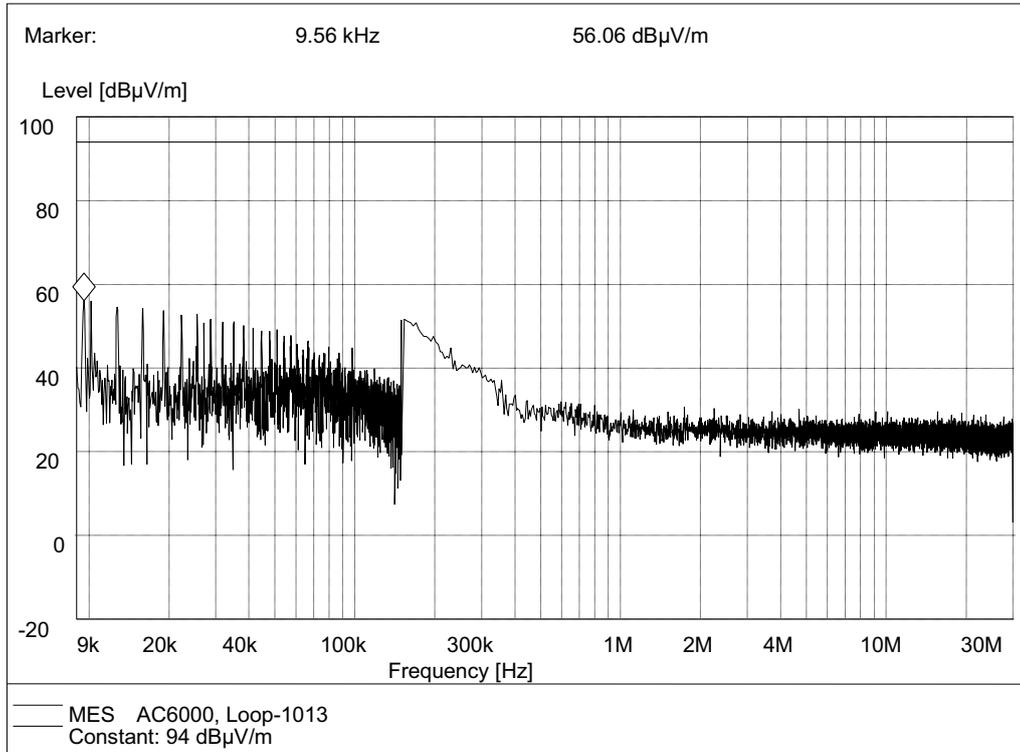


### Plot of Spurious Emission

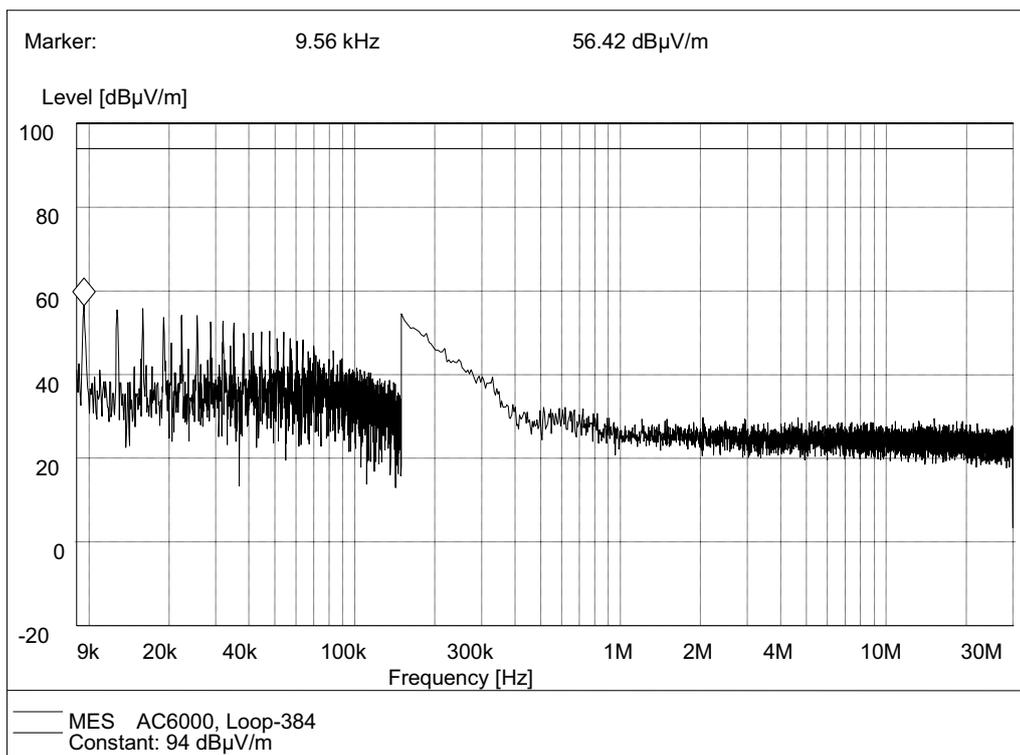
(Note: The marker point is the MS transmitting frequency which should be ignored.)

#### I. 9kHz to 30MHz

1. Lowest channel No.1013,

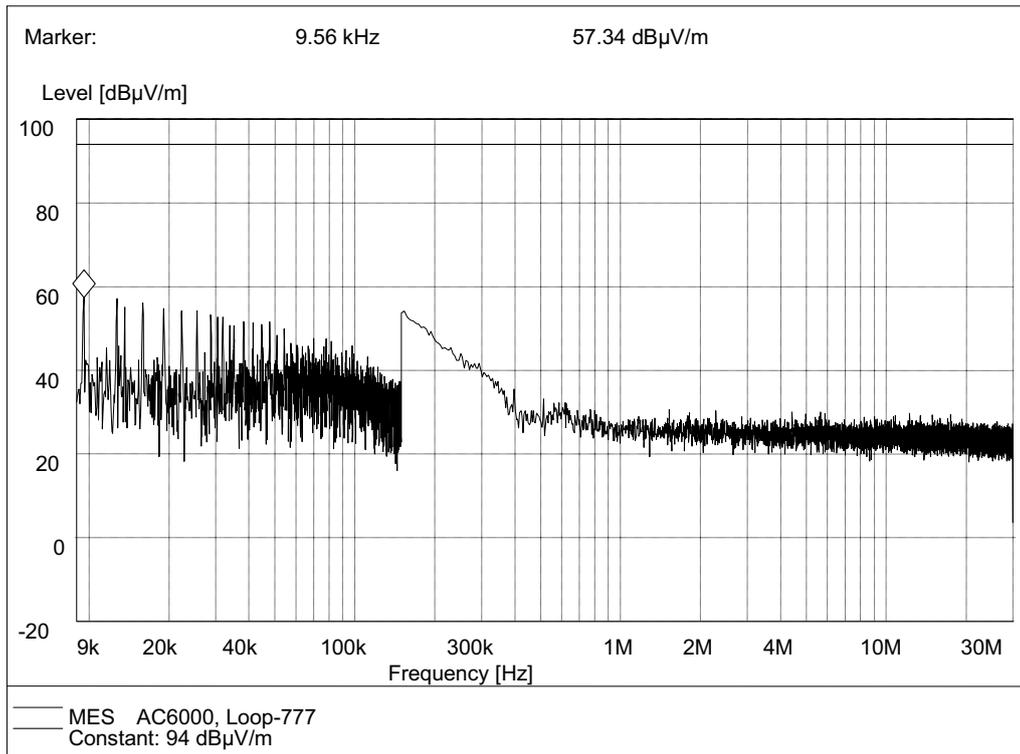


2. Middle channel No.384





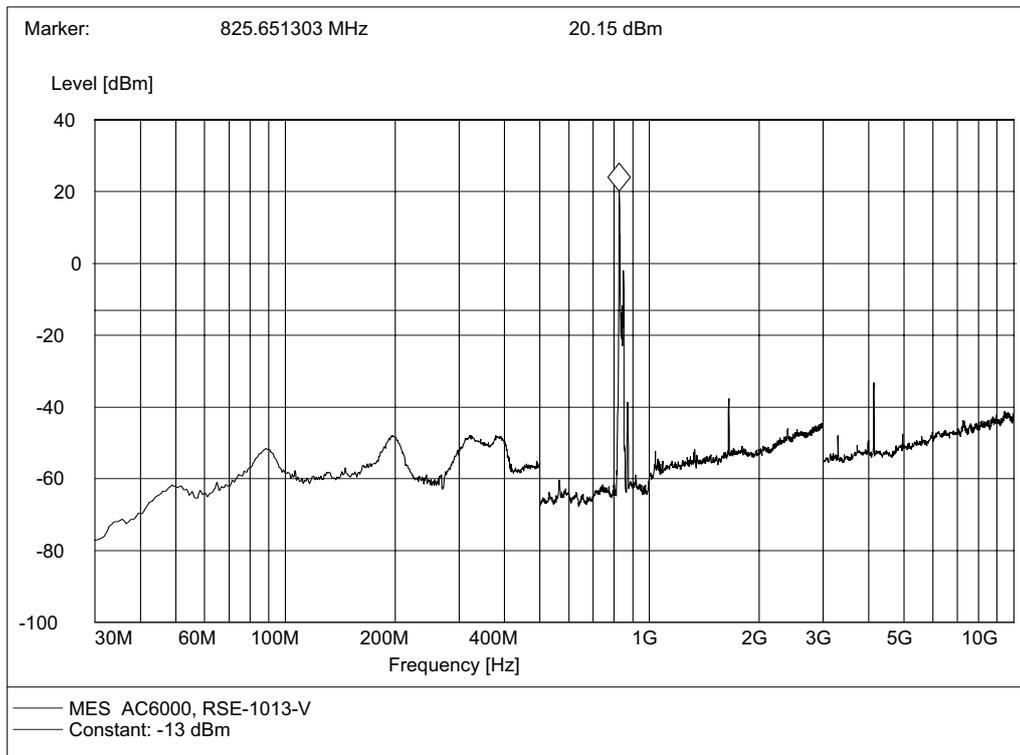
### 3. Highest channel No.777



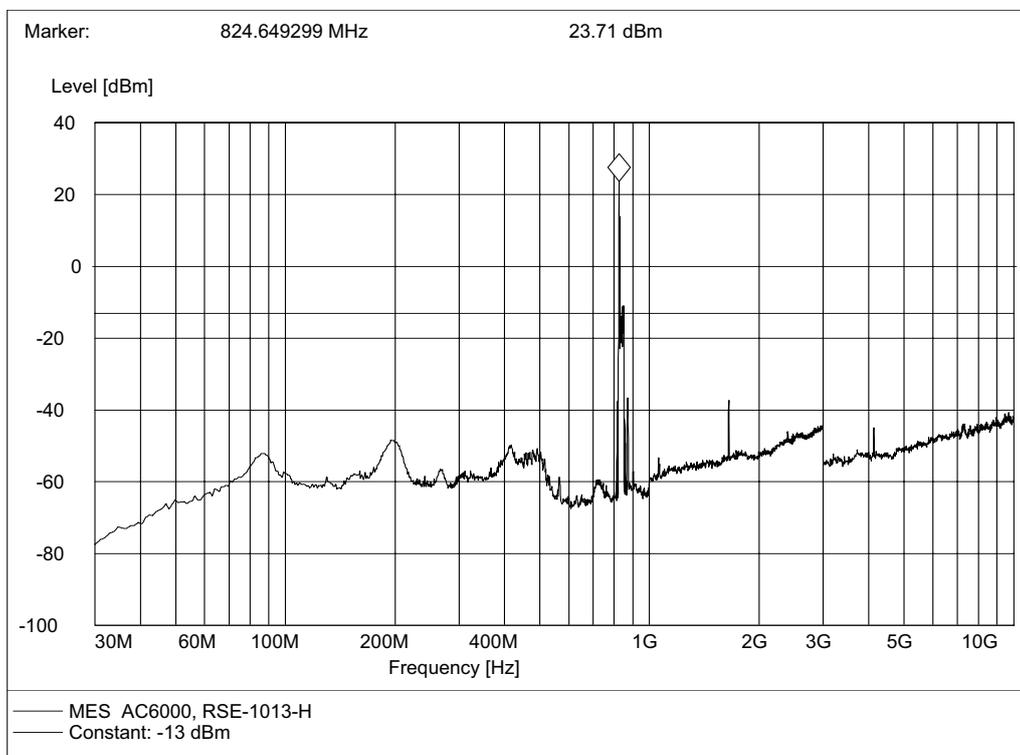


## II. Above 30 MHz

### 1. Lowest channel No.1013, antenna vertical

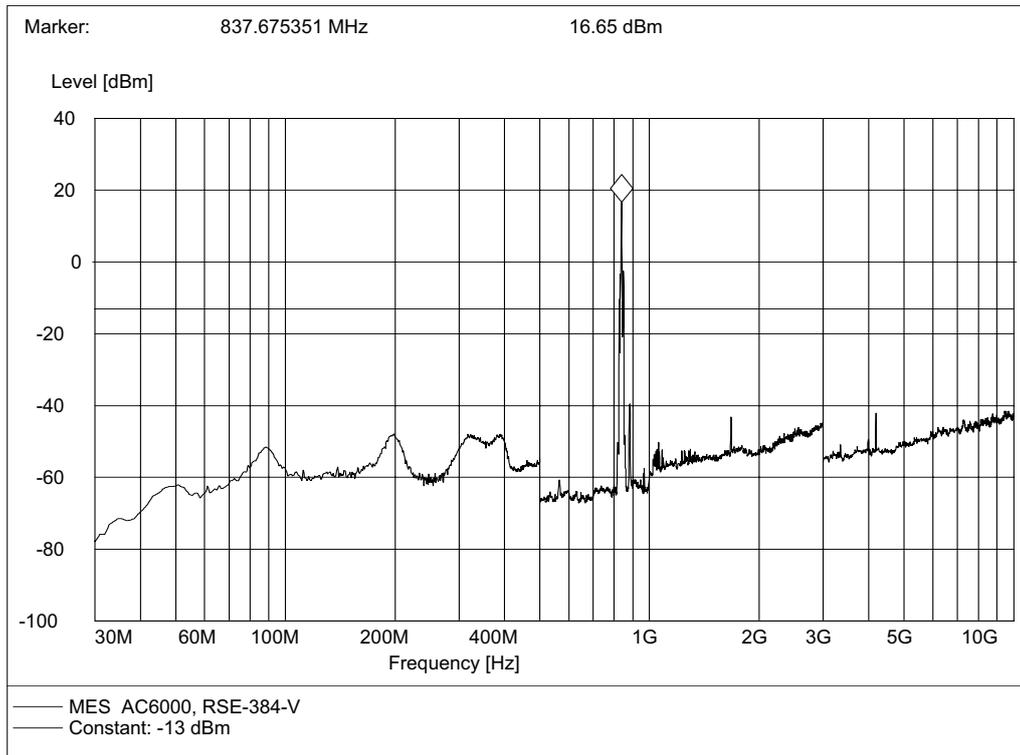


### 2. Lowest channel No.1013, antenna horizontal

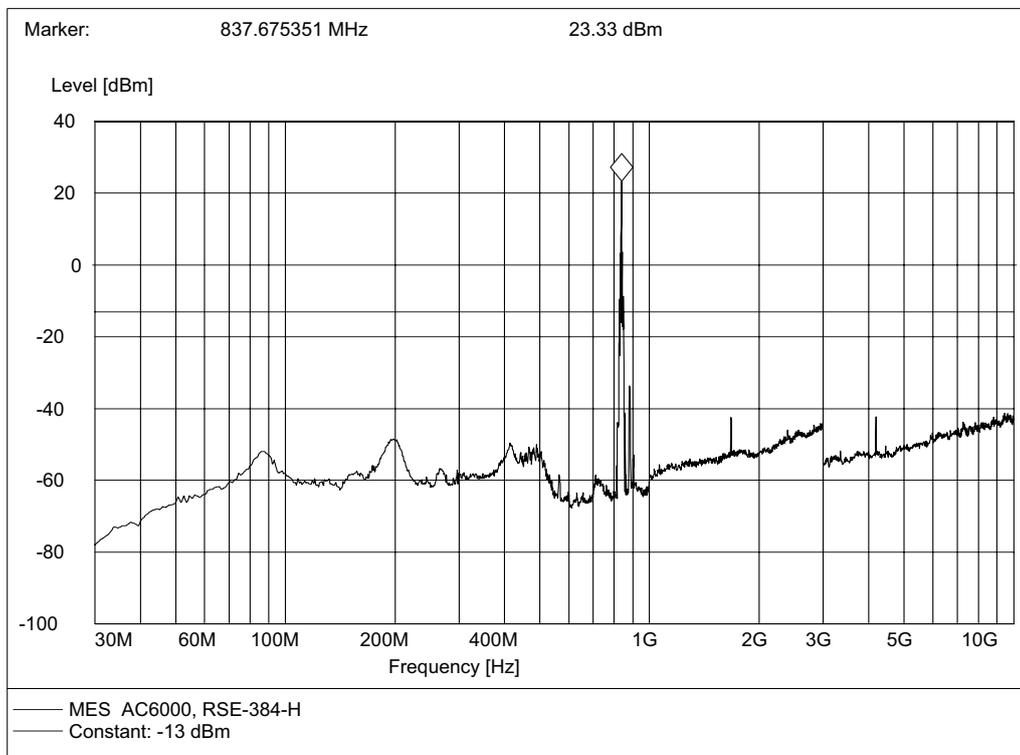




### 3. Middle channel No.384, antenna vertical

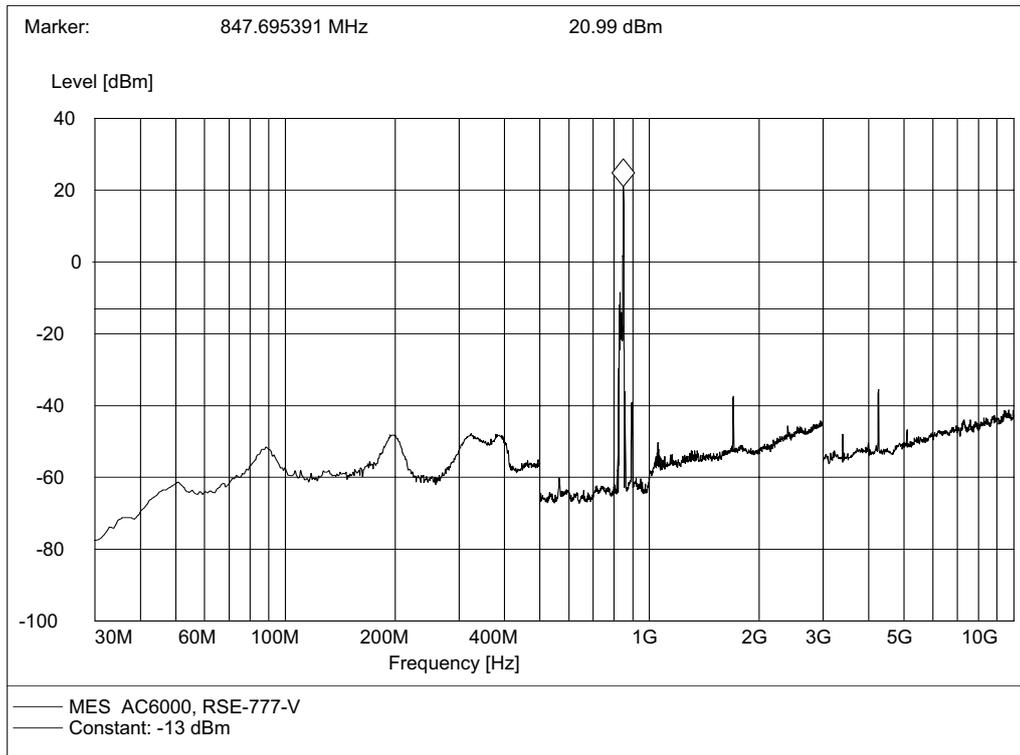


### 4. Middle channel No.384, antenna horizontal

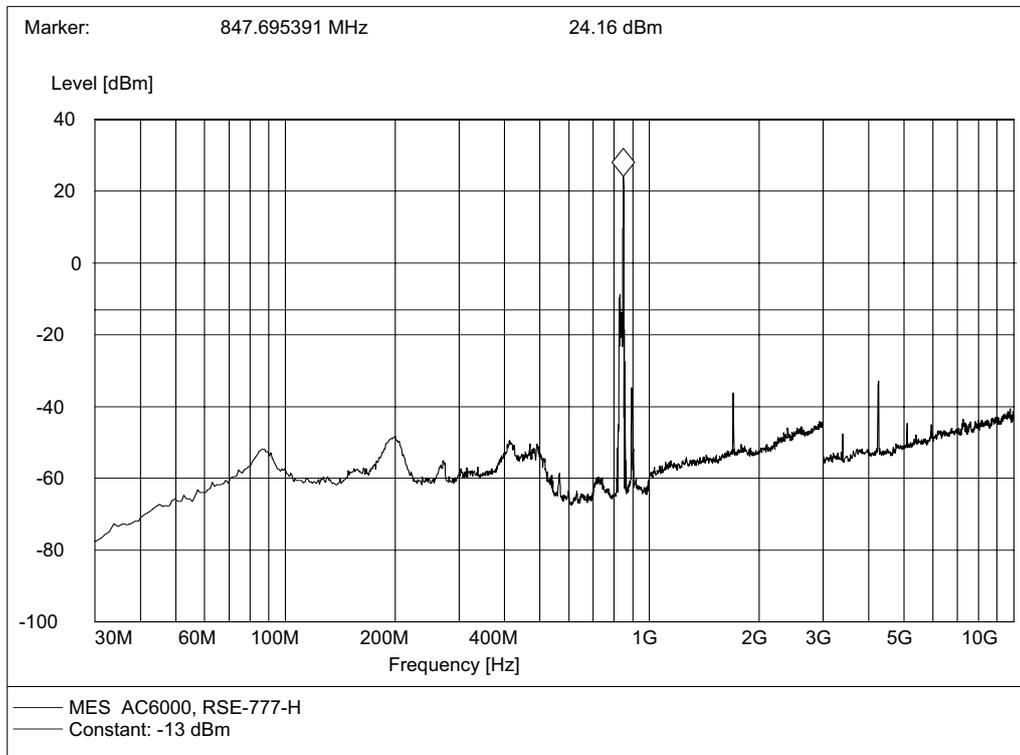




### 5. Highest channel No.777, antenna vertical



### 6. Highest channel No.777, antenna horizontal



## 9 Frequency Stability Test

### 9.1 Requirement of Frequency Stability

According to FCC §22.355, the carrier frequency of each transmitter (821-896MHz,  $\leq 3$ W) must be maintained within  $\pm 2.5$ ppm.

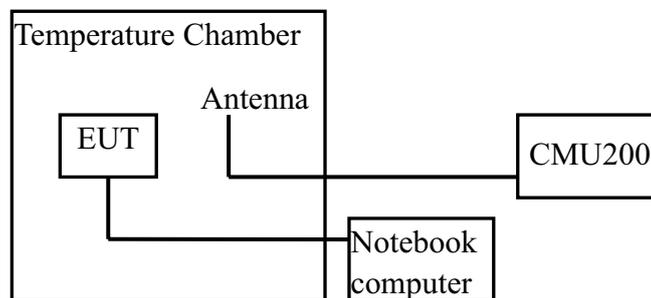
According to FCC §2.1055, the test conditions are:

- **Temperature:** The temperature is varied from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of not more than  $10^{\circ}\text{C}$ .
- **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.

### 9.2 Test Procedure

- The temperature was varied from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of  $10^{\circ}\text{C}$ . At each temperature level, the EUT was powered off and put in the temperature chamber for 2 hour.
- After sufficient stabilization, the EUT was turned on and a communication link was established. The frequency was measured within three minutes.
- For extreme supply voltage measurement, the EUT was tested at room temperature.

### 9.3 Test Setup



## 9.4 EUT Setup and Operating Conditions

The EUT was connected to USB port of a notebook computer (Lenovo, 2668).

A communication link was established between the MS and a System Simulator (SS). The MS operated at CDMA (EV-DO) data mode and the maximum output power. The CDMA (Cellular band) channel No.1013 (lowest), 384 (middle) and 777 (highest) were measured respectively.

## 9.5 Test Results

No.	Test Conditions		Frequency Deviation (Hz)			Limit ( $\pm 2.5\text{ppm}$ )
	Voltage	Temperature ( $^{\circ}\text{C}$ )	1013CH	384CH	777CH	
1	$V_{\text{nom}}(5\text{V})$	-30	-2	+5	-10	1013CH, $\pm 2067\text{Hz}$ 384CH, $\pm 2087\text{Hz}$ 777CH, $\pm 2120\text{Hz}$
2		-20	+11	+8	-1	
3		-10	-4	+15	-6	
4		0	+25	+17	-11	
5		+10	+13	+17	+15	
6		+20	+24	+6	+12	
7		+30	+10	+29	+22	
8		+40	-4	+4	+14	
9		+50	+28	+18	+18	
10		$V_{\text{max}}$	+22	--	--	
11	$V_{\text{min}}$	+22	--	--	--	

### NOTE:

1. Frequency stability vs. voltage variation was not performed because the notebook computer feeds a constant voltage to the PCMCIA port where the EUT plugged. Changing the supply voltage of the notebook computer will not cause a supply voltage variation of the EUT.

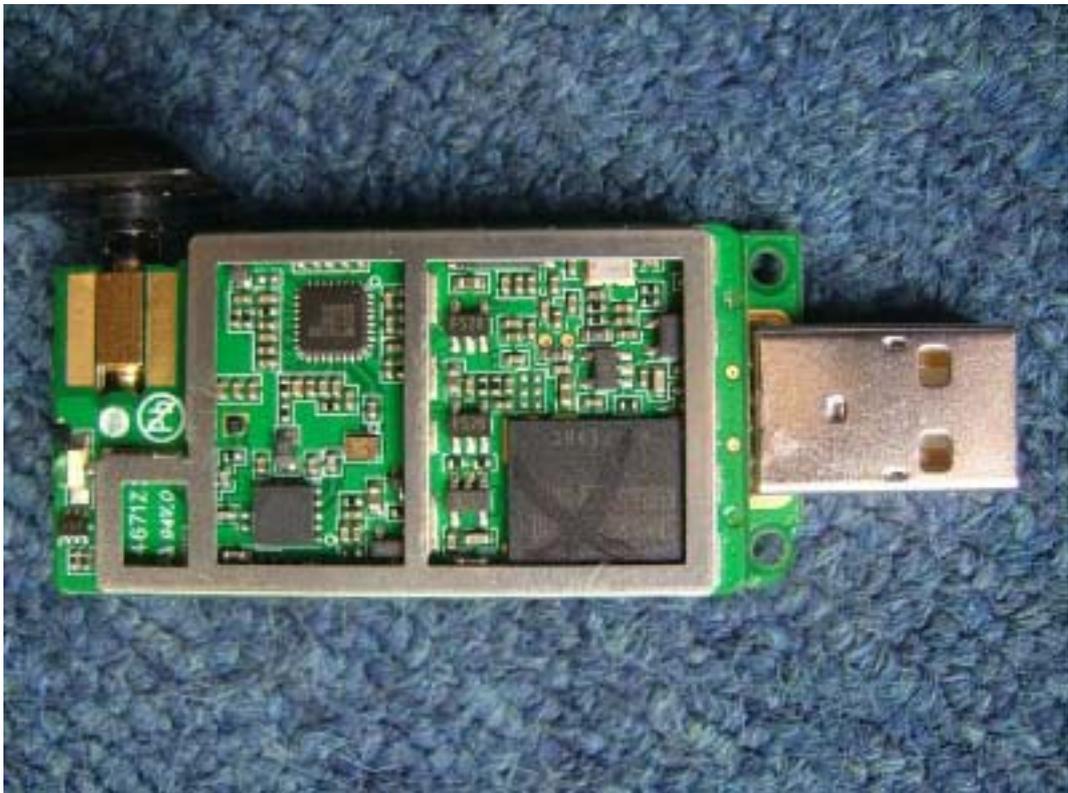
## Appendix I: Photographs of the EUT

### 1. Appearance of the EUT



## 2. Inside of the EUT







## Appendix II: Photographs of the Test Configuration

### 1. Conducted RF Test



### 2. Radiated RF Test



### 3. Radiated RF Test (9 kHz~30 MHz)

