47 CFR PART 22H

TEST REPORT

of

USB modem

Trade Name:	Haier
Brand Name:	Haier
Model Name:	HC-CM210
Report No.:	SZ10070079E01
FCC ID.:	SG71007HC-CM210

prepared for

Qingdao Haier Telecom Co.,Ltd
No.1, Haier Road Hi-tech Zone, Qingdao, 266101, P.R.China

prepared by

Shenzhen Morlab Communications Technology Co., Ltd.
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Change History		
Issue	Date	Reason for change
1.0	August 23, 2010	First edition

1. Test Result Certification

Equipment under Test:	USB modem
Trade Name:	Haier
Brand Name:	Haier
Model Name:	HC-CM210
FCC ID:	SG71007HC-CM210
Applicant:	Qingdao Haier Telecom Co.,Ltd No.1, Haier Road Hi-tech Zone, Qingdao, 266101, P.R.China
Manufacturer:	Qingdao Haier Telecom Co.Ltd No.1, Haier Road Hi-tech Zone, Qingdao, 266101, P.R.China
Emission Designator:	1M25F9W
Test Standards:	47 CFR Part 2 47 CFR Part 22 Subpart H
Test Result:	PASS

*** We Hereby Certify That:**

The equipment under test was tested by Shenzhen Morlab Communications Technology Co., Ltd. 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: Mo Huina Dated: 2010.08.23
Mo Huina

Reviewed by: Ni Yong Dated: 2010.08.23
Ni Yong

Approved by: Shu Luan Dated: 2010.08.23
Shu Luan

2. General Information

2.1 Equipment under Test (EUT) Description

Description ..... :	USB modem
Model Name ..... :	HC-CM210
Serial No. ..... :	(n.a)
MEID ..... :	(n.a)
Hardware Version ..... :	CM210V1.0
Software Version..... :	CM200V_2.57
Modulation ..... :	CDMA 1X
Frequency ..... :	Tx: 824.7 – 848.31 MHz; Rx: 869.7-893.31MHz

NOTE:

1. The EUT is a model of CDMA1X USB Modem.
2. The EUT can receive the electric power from the PC via USB point and can be used as a storage when inserted with a T-Flash card.
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 (10-1-09 Edition)	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 (EIPR/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 CNAS 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 Environment Conditions

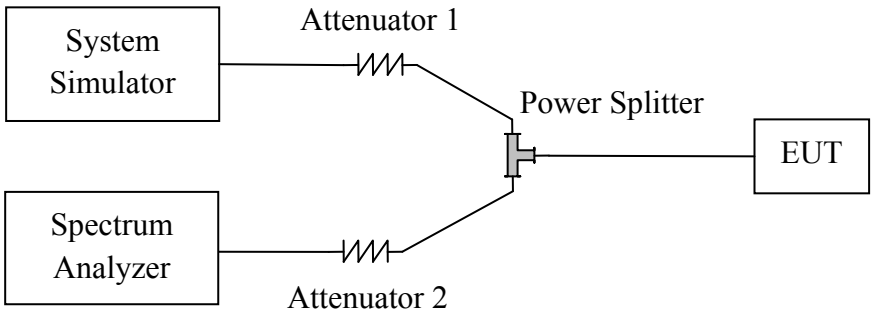
During the measurement, the environmental conditions were within the listed ranges:

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

3. 47 CFR Part 2, Part 22H Requirements

3.1 General Information

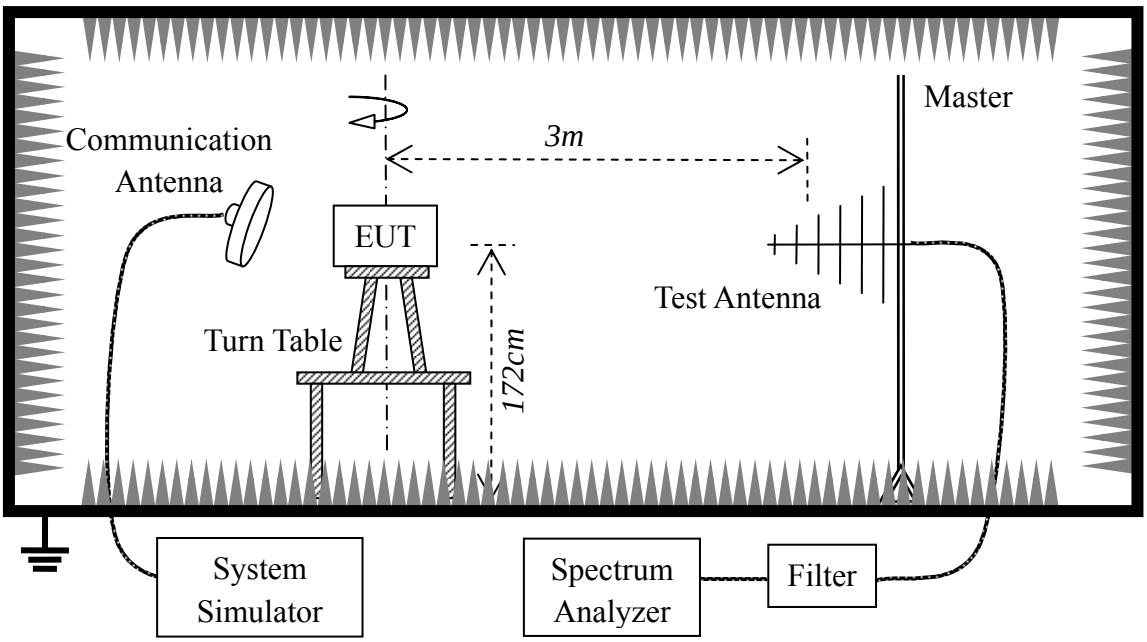
3.1.1 Conducted Related Tests



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 + USB-Power.
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.
5. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB43130131	2009.09	1year
Spectrum Analyzer	Agilent	E7405A	US44210471	2009.09	1year
Power Splitter	Weinschel	1506A	NW521	(n.a.)	(n.a.)
Attenuator 1	Resnet	20dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)

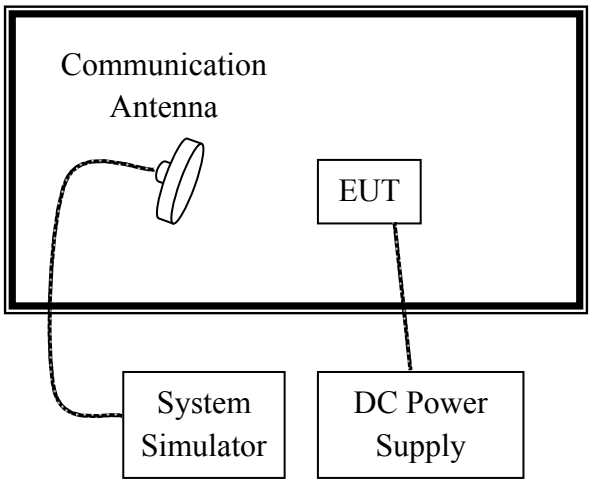
3.1.2 Radiated Power and Spurious Emission Tests



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 + USB-Power.
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.
7. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB43130131	2009.09	1year
Spectrum Analyzer	Agilent	E7405A	US44210471	2009.09	1year
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2009.09	2year
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2009.09	1year
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2009.09	1year

3.1.3 Frequency Stability Test



1. The test is performed in a Temperature Chamber.
2. The EUT is configured as MS + USB-Power.
3. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB43130131	2009.09	1year
DC Power Supply	Good Will	GPS-3030DD	EF920938	2009.09	2year
Temperature Chamber	YinHe Experimental Equip.	HL4003T	(n.a.)	2009.09	1year

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.

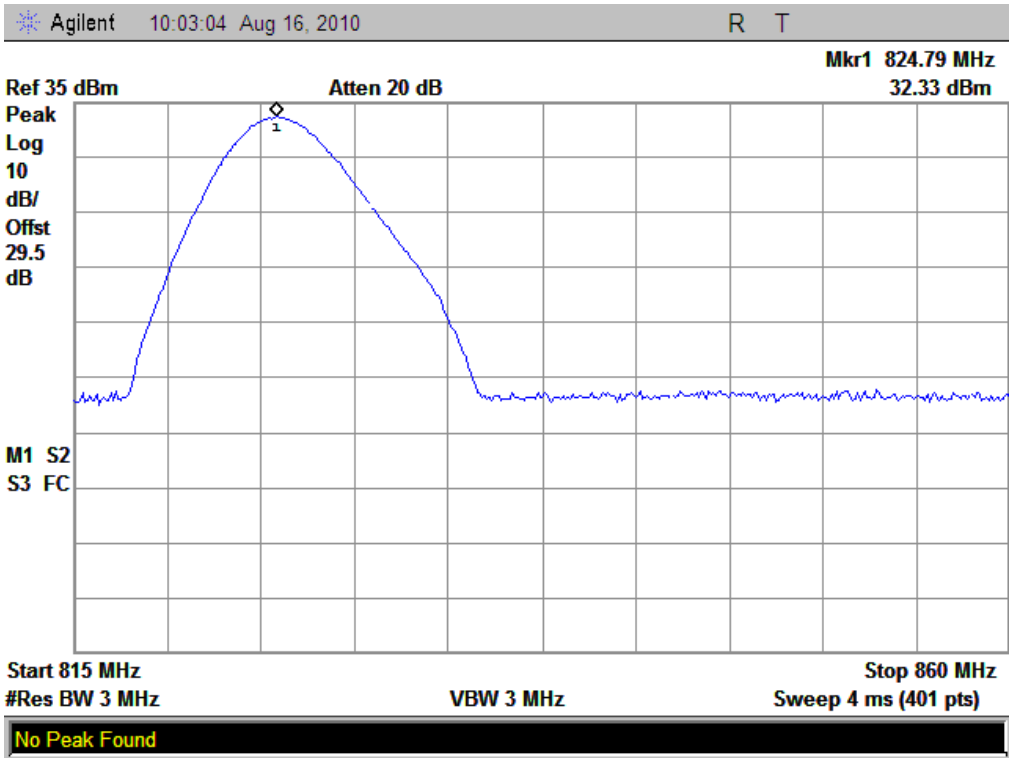
3.2.2 Test Procedure

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. Set the TCH number to 9 as the low channel.
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.
5. Set the TCH number to 384 as the middle channel, then repeat step 4.
6. Set the TCH number to 777 as the high channel, then repeat step 4.

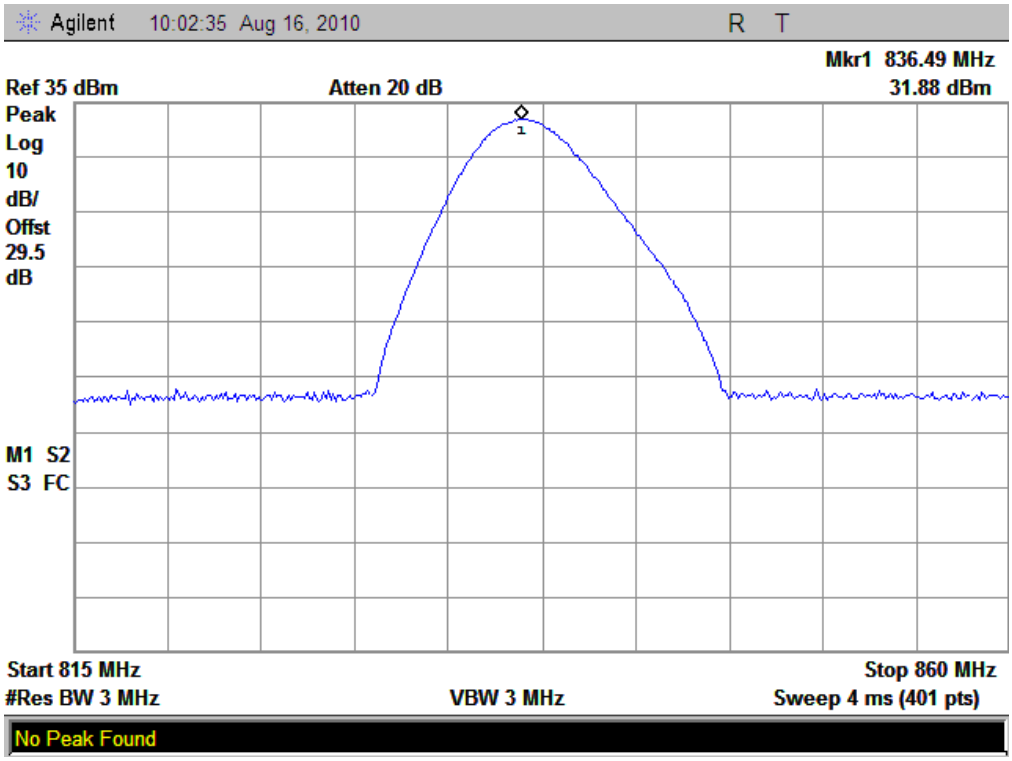
3.2.3 Test Result

No.	Channel Number	Frequency (MHz)	Measured Power		Rated Power	
			dBm	W	dBm	W
1	1013	824.7	32.33	1.71	33	2
2	384	836.52	31.88	1.54	33	2
3	777	848.31	32.39	1.73	33	2

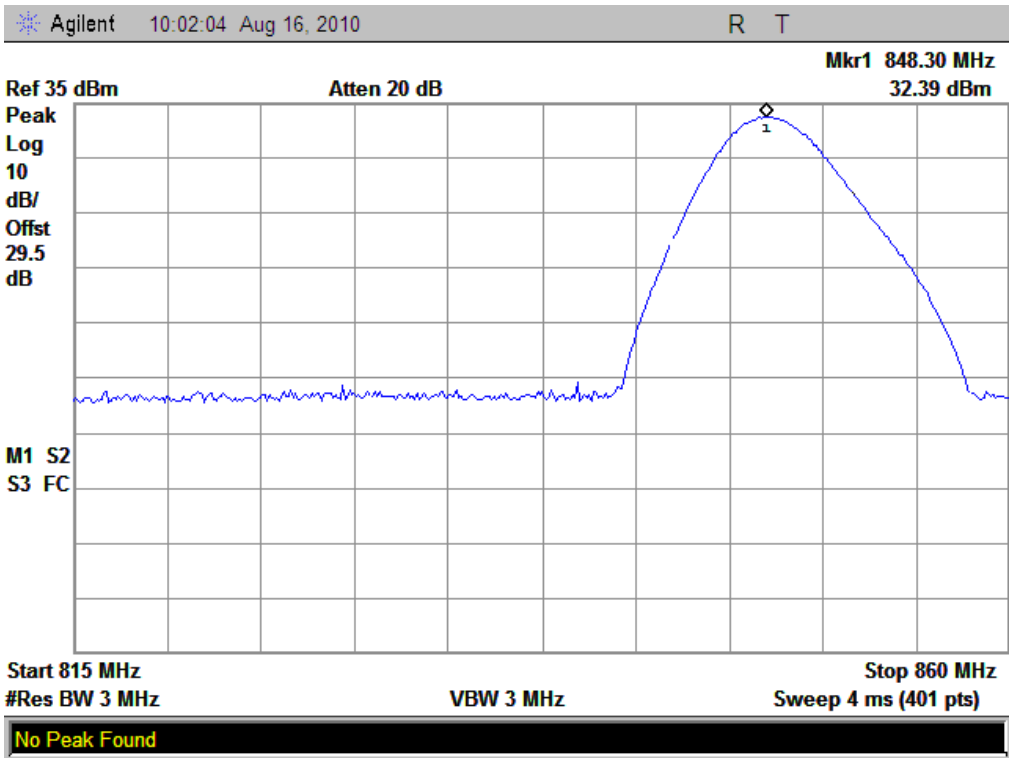
1. Plot when the TCH number set to 1013:



2. Plot when the TCH number set to 384:



3. Plot when the TCH number set to 777:


Agilent 10:02:04 Aug 16, 2010
R T
Mkr1 848.30 MHz
32.39 dBm
Ref 35 dBm
Atten 20 dB
Peak
Log
10
dB/
Offst
29.5
dB
M1 S2
S3 FC
Start 815 MHz
#Res BW 3 MHz
VBW 3 MHz
Stop 860 MHz
Sweep 4 ms (401 pts)
No Peak Found

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.

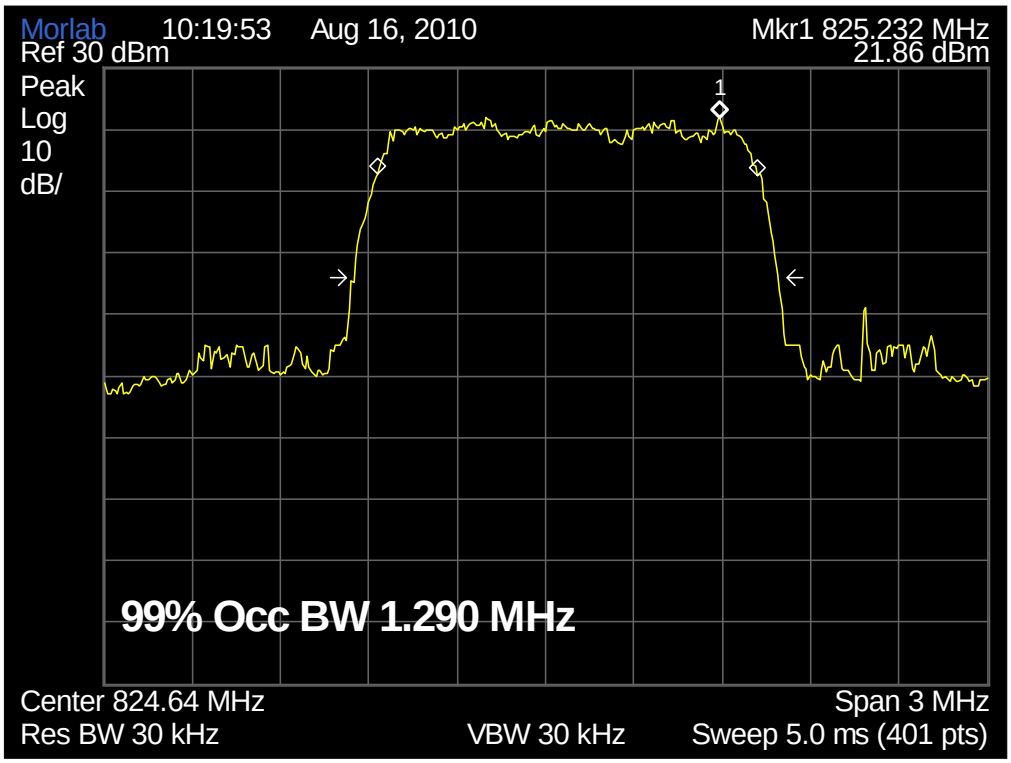
3.3.2 Test Procedure

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. Set the TCH number to 1013 as the low channel.
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.
5. Set the TCH number to 384 as middle channel, then repeat step 4.
6. Set the TCH number to 777 as high channel, then repeat step 4.

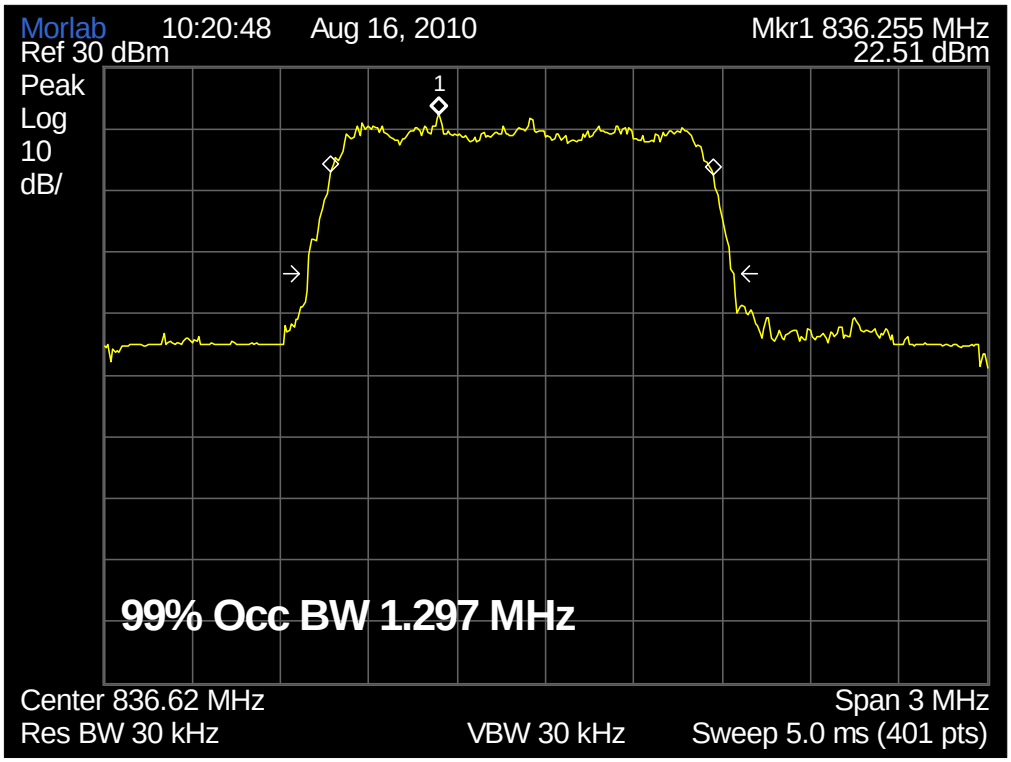
3.3.3 Test Result

No.	Channel Number	Frequency (MHz)	Measured Occupied Bandwidth (MHz)
1	1013	824.7	1.290
2	384	836.52	1.297
3	777	848.31	1.283

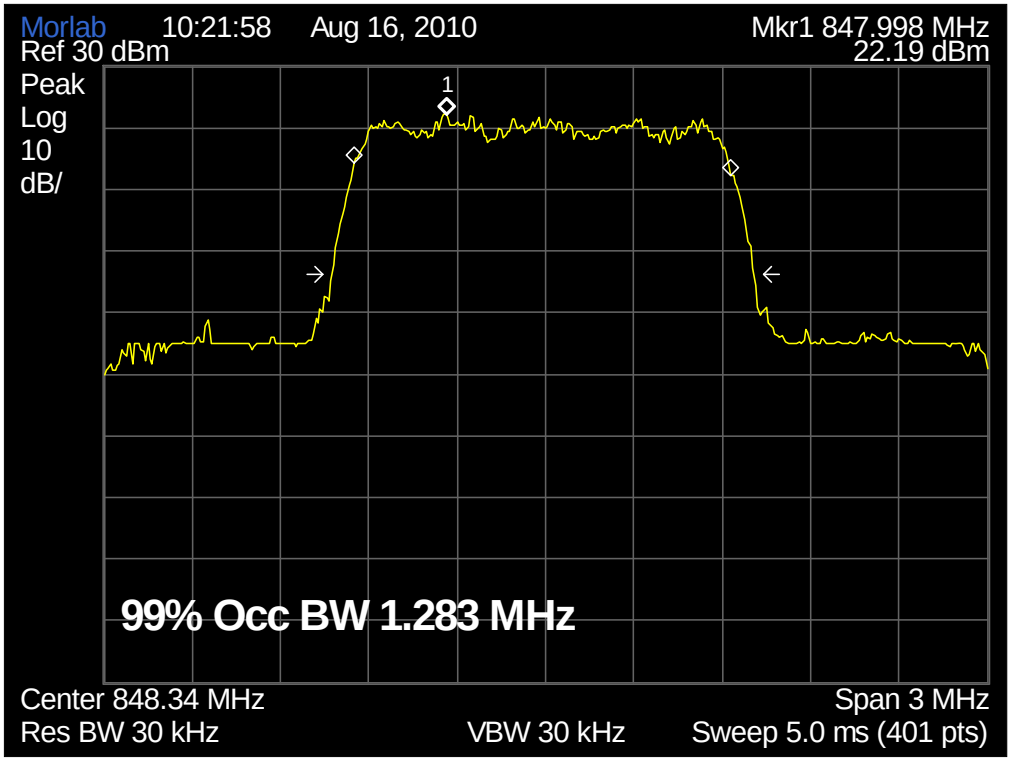
1. Plot when the TCH number set to 1013:



2. Plot when the TCH number set to 384:



3. Plot when the TCH number set to 777:


Morlab
10:21:58 Aug 16, 2010
Mkr1 847.998 MHz
22.19 dBm
Ref 30 dBm
Peak
Log
10
dB/
1
99% Occ BW 1.283 MHz
Center 848.34 MHz
Span 3 MHz
Res BW 30 kHz
VBW 30 kHz
Sweep 5.0 ms (401 pts)

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. Set the TCH number to 1013 as the lowest channel.
4. Set the RBW of the Spectrum Analyzer to 1MHz, and the measuring frequency range from 9kHz to 10^{th} 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.
6. Set the TCH number to 384 as the middle channel, then repeat step 4 and 5.
7. Set the TCH number to 777 as the highest channel, then repeat step 4 and 5.

3.4.3 Test Result

3.4.3.1 Table for the Harmonics and Plots for the Spurious Emission

1. Table for the Harmonics:

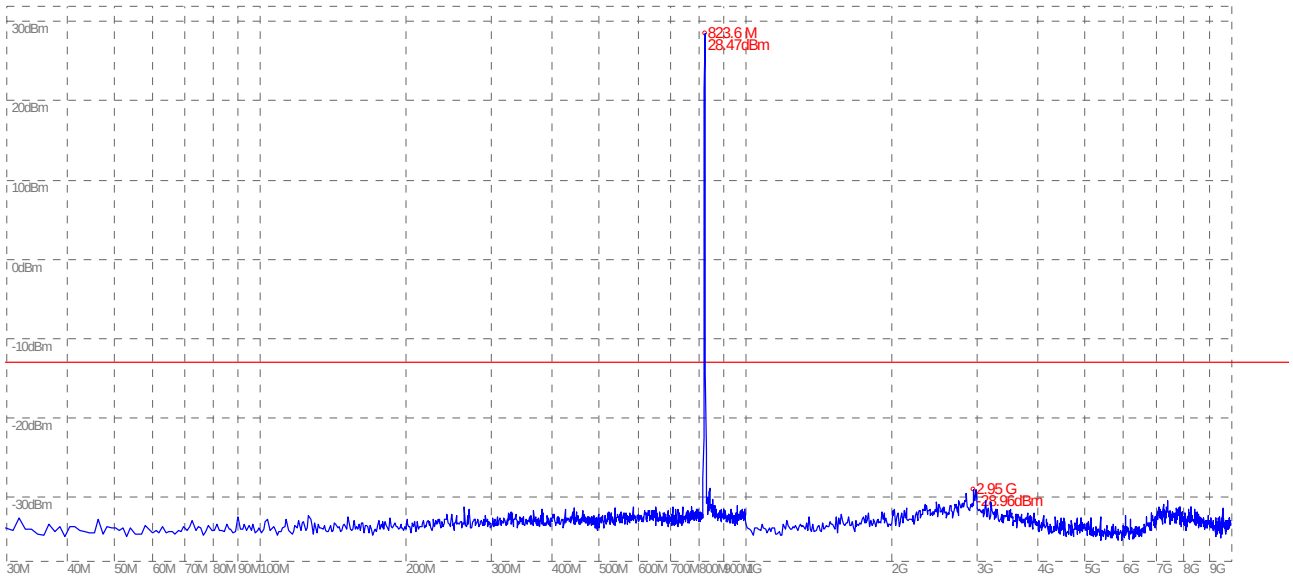
No.	Channel	Frequency(MHz)	Measured Max Spurious Emission(dBm)	Limit(dBm)
1.	1013	824.7	-28.96	-13
2.	384	836.52	-29.35	-13
3.	777	848.31	-29.26	-13

2. Plot for Spurious Emission:

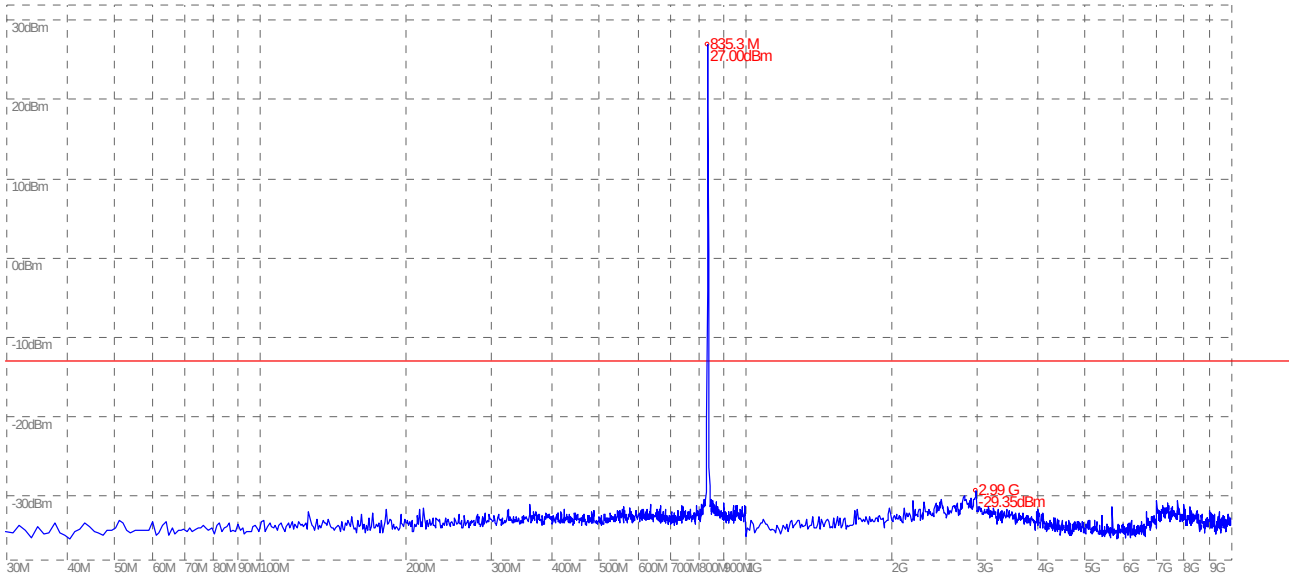
The measuring frequency range was from 9kHz to 10GHz.

NOTE: The marker points are the Mobile Phone and/or System Simulator transmitting frequencies which should be ignored.

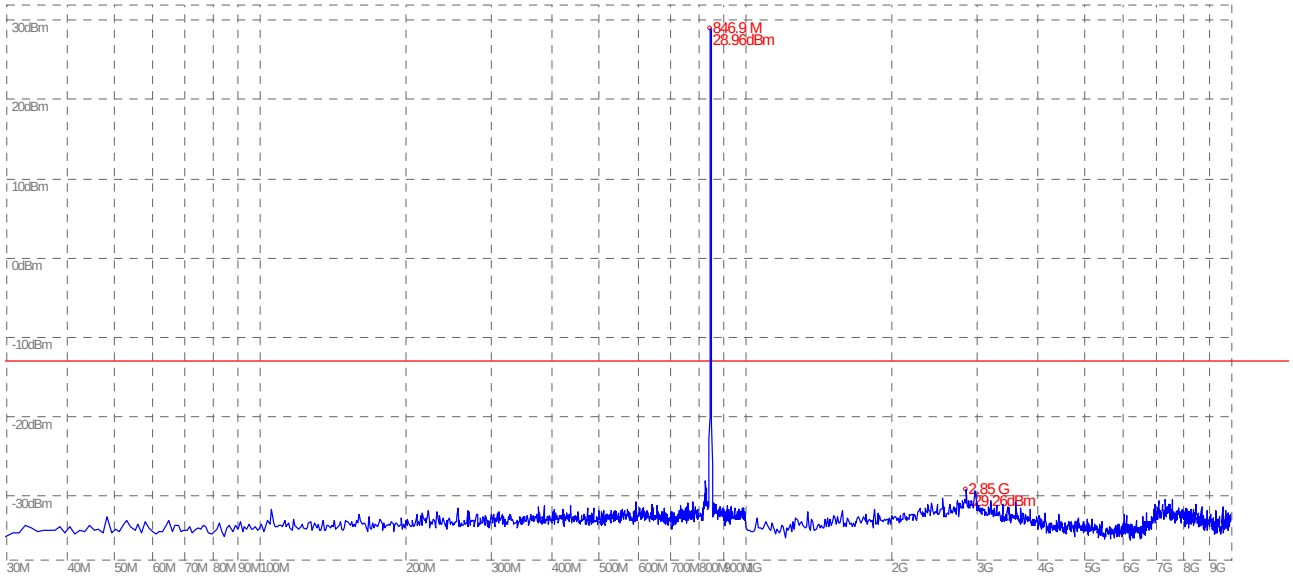
2.1 Plot when the TCH number set to 1013:



2.2 Plot when the TCH number set to 384:

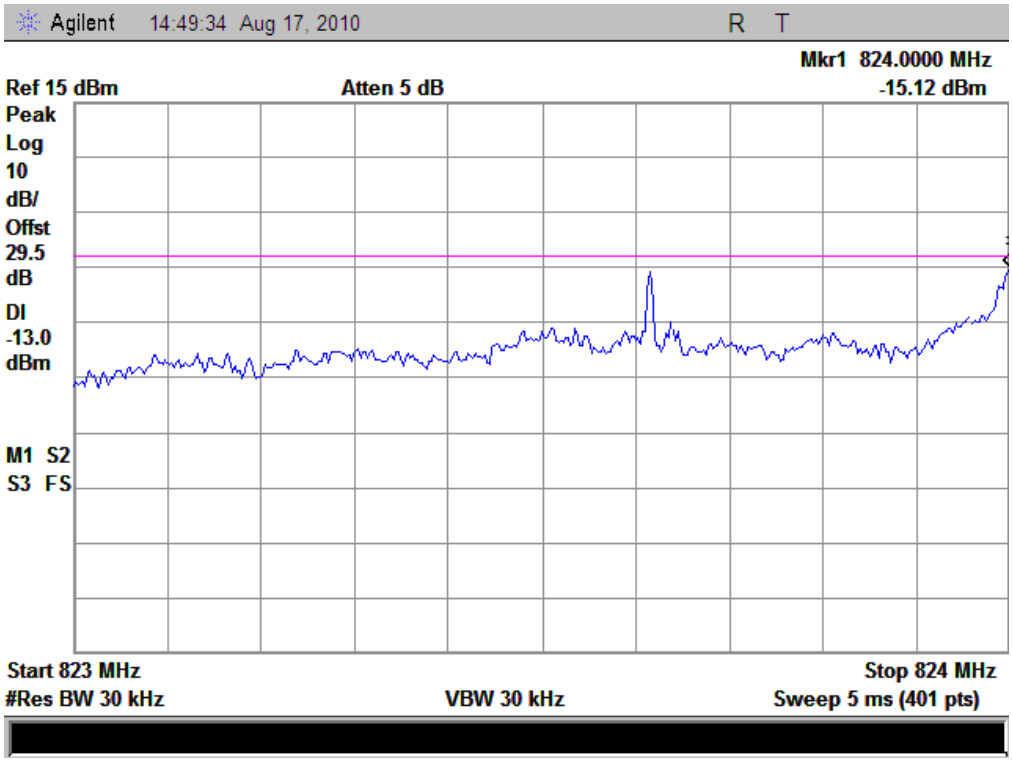


2.3 Plot when the TCH number set to 777:

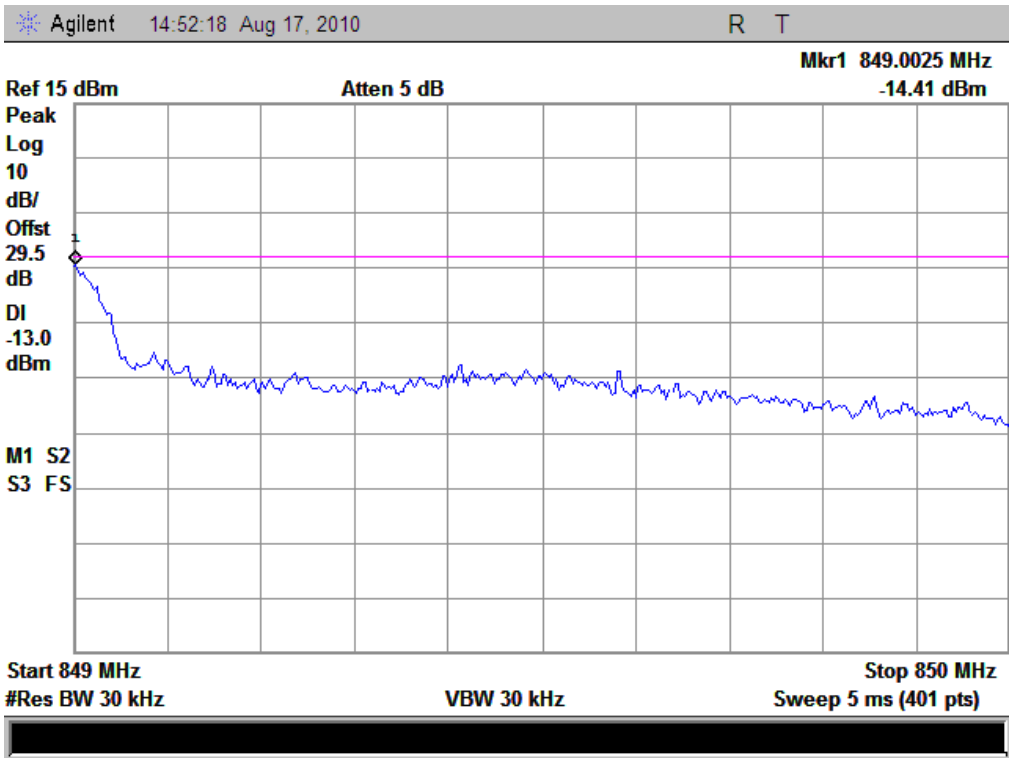


3.4.3.2 Plot for Band-edge

1. Plot when the TCH number set to 1013:



2. Plot when the TCH number set to 777:



3.5 Transmitter Radiated Power (EIRP/ERP)

3.5.1 Requirement

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

3.5.2 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. Set the TCH number to 1013 as the low channel.
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.
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.

3.5.3 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:

SCF_{Offset} = Pg(dBm) – cable loss (dB) + antenna gain (dB) – Pr(dBm)

Where Pg is the generator output power into the substitution antenna

Cable loss is the reduction in power between the generator and the substitution antenna

Antenna gain is the gain of the substitution antenna relative to an ideal half wave dipole antenna (for ERP) or isotropic radiator (for EIRP)

Pr is the spectrum analyzer reading

SCF_{Offset} is substitution correction factor.

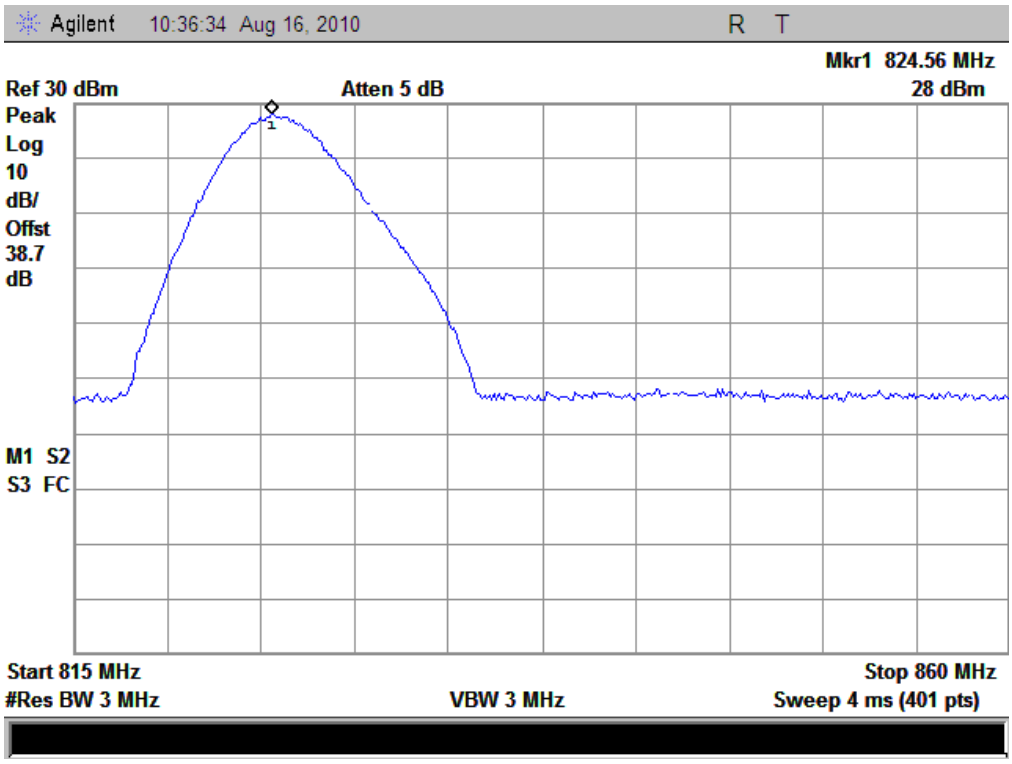
Calculation example:

Band	SCF_{Offset}	Pg(dBm)	cable loss (dB)	antenna gain	Pr(dBm)
CDMA800	38.7 dB	0 dBm	0.3 dB	7.94 dBd	-31.06 dBm

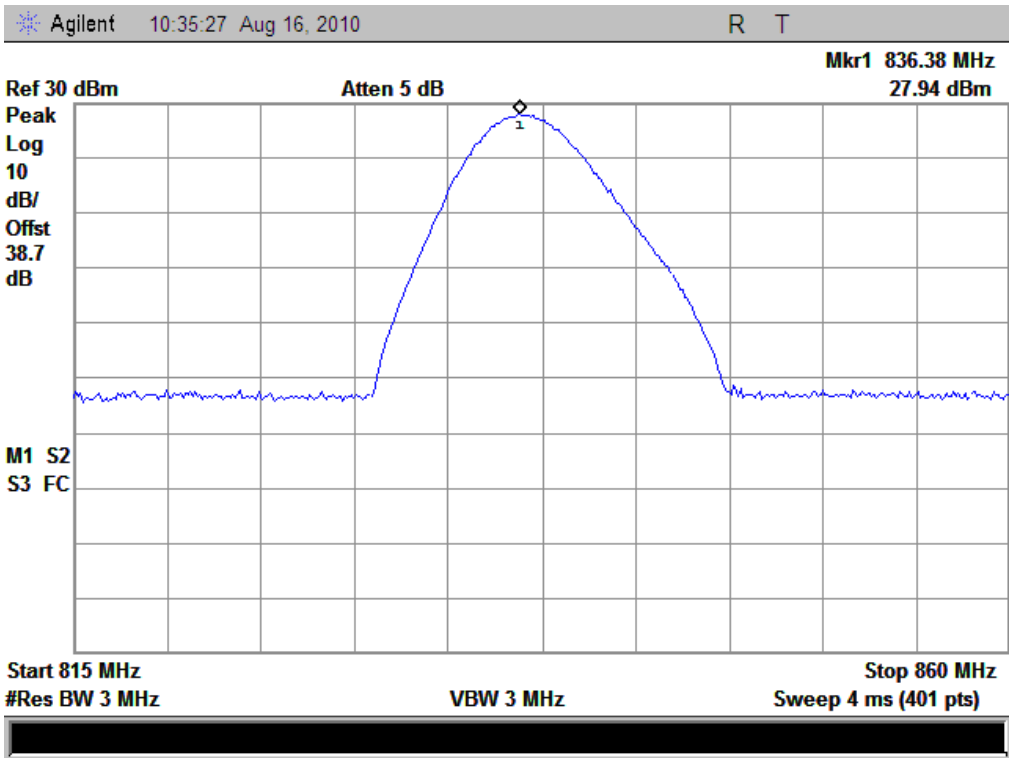
During the test, the data of SCF_{Offset} was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of SCF_{Offset}.

No.	Channel	Frequency (MHz)	Measured ERP		Limit ERP	
			dBm	W	dBm	W
1	1013	824.7	28	0.63	< 38.5	< 7
2	384	836.52	27.94	0.62	< 38.5	< 7
3	777	848.31	26.35	0.43	< 38.5	< 7

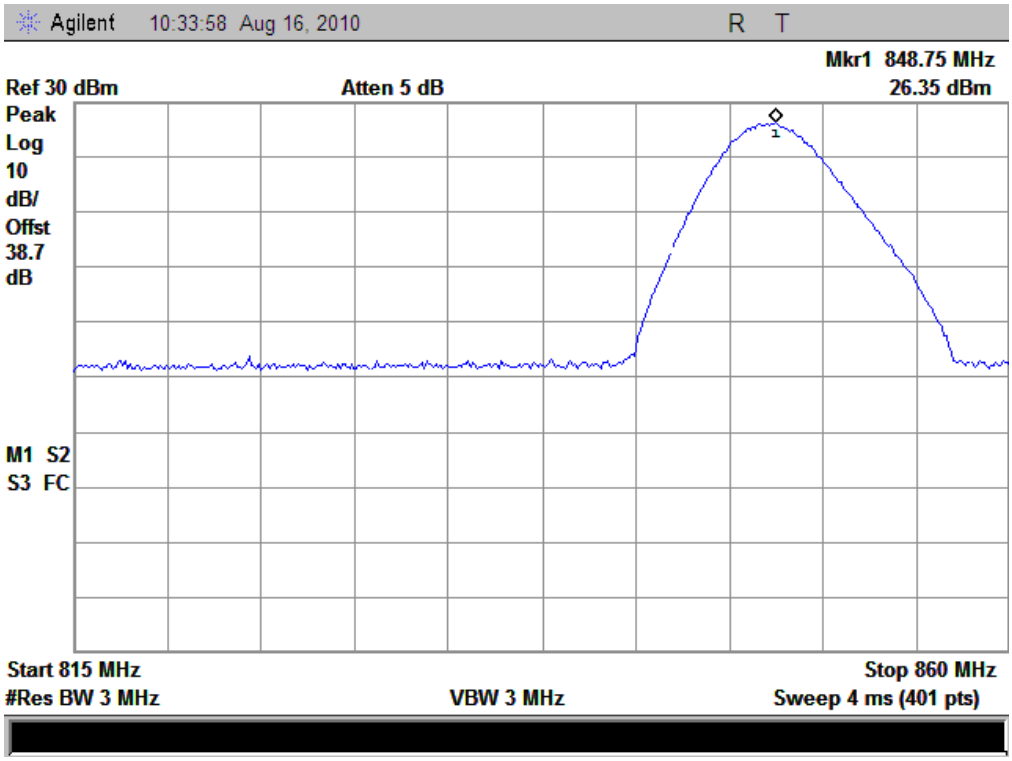
1. Plot when the TCH number set to 1013:



2. Plot when the TCH number set to 384:



3. Plot when the TCH number set to 777:



3.6 Radiated Spurious Emission

3.6.1 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.

3.6.2 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. Set the TCH number to 1013 as the low channel.
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 10^{th} harmonic of the fundamental frequency (here used 10GHz), then repeat step 5 to 7.
9. Set the TCH number to 384 as the middle channel, then repeat step 4 to 8.
10. Set the TCH number to 777 as the high channel, then repeat step 4 to 8.

3.6.3 Test Result

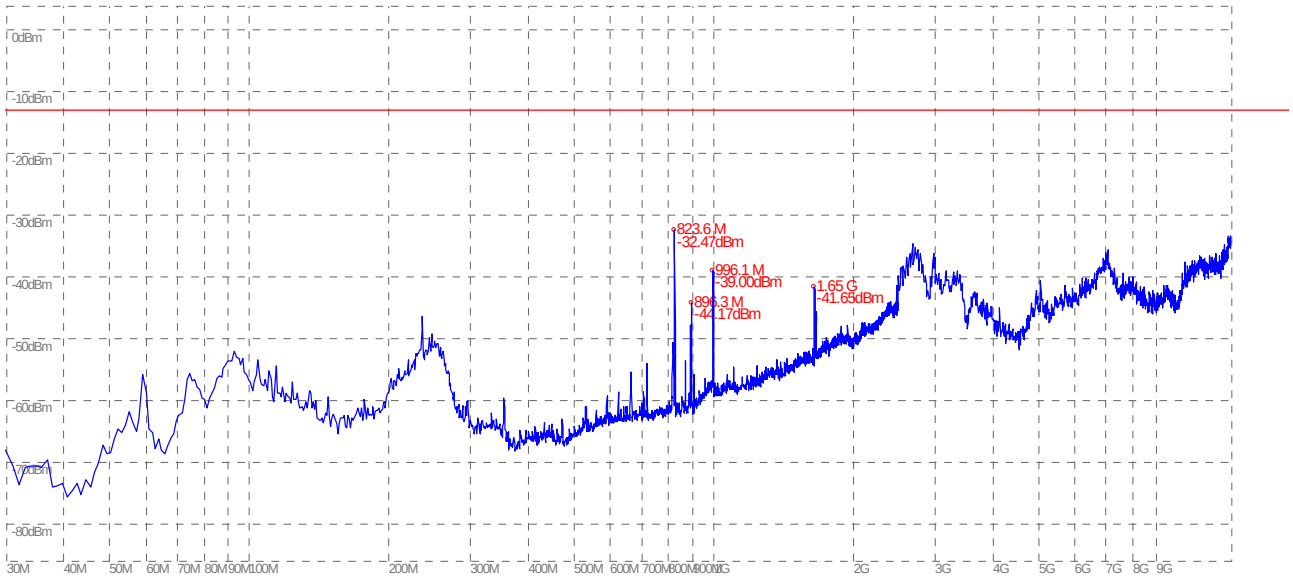
3.6.3.1 Table for the Harmonics

NOTE: "---" in the table following means that the emission power was too small to be measured and was at least 12dB below the limit.

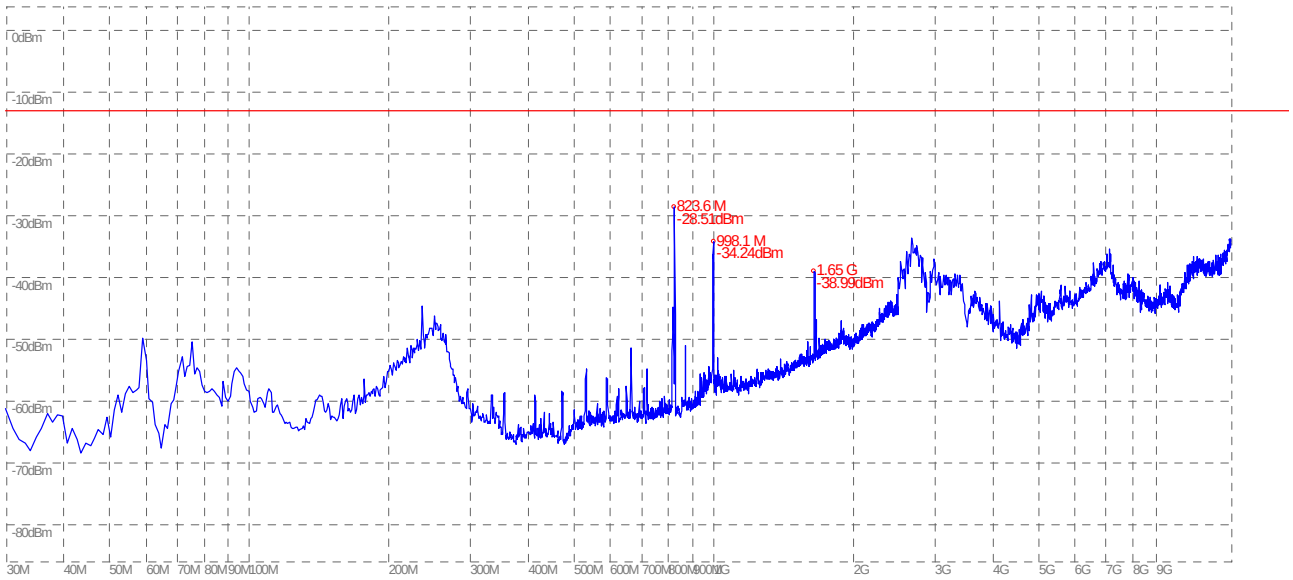
No.	Frequency (MHz)	Emission Power (dBm)		Limit (dBm)
		Test Antenna Vertical	Test Antenna Horizontal	
TCH number set to 1013 (824.7MHz)				
1	1650.54	-41.65	-38.99	-13
2	2475.81	---	---	-13
3	3301.08	---	---	-13
4	4126.35	---	---	-13
5	4951.62	---	---	-13
6	5776.89	---	---	-13
7	6602.16	---	---	-13
8	7427.43	---	---	-13
9	8252.70	---	---	-13
TCH number set to 384 (836.52MHz)				
10	1673.04	-35.80	-36.86	-13
11	2509.56	---	---	-13
12	2509.56	---	---	-13
13	3346.08	---	---	-13
14	4182.6	---	---	-13
15	5855.64	---	---	-13
16	6692.16	---	---	-13
17	7528.68	---	---	-13
18	8365.20	---	---	-13
TCH number set to 777 (848.31MHz)				
19	1695.48	-35.38	-39.52	-13
20	2543.22	---	---	-13
21	3390.96	---	---	-13
22	4238.70	---	---	-13
23	5086.44	---	---	-13
24	5934.18	---	---	-13
25	6781.92	---	---	-13
26	7629.66	---	---	-13
27	8477.40	---	---	-13

Test Plot for the Whole Measurement Frequency Range:

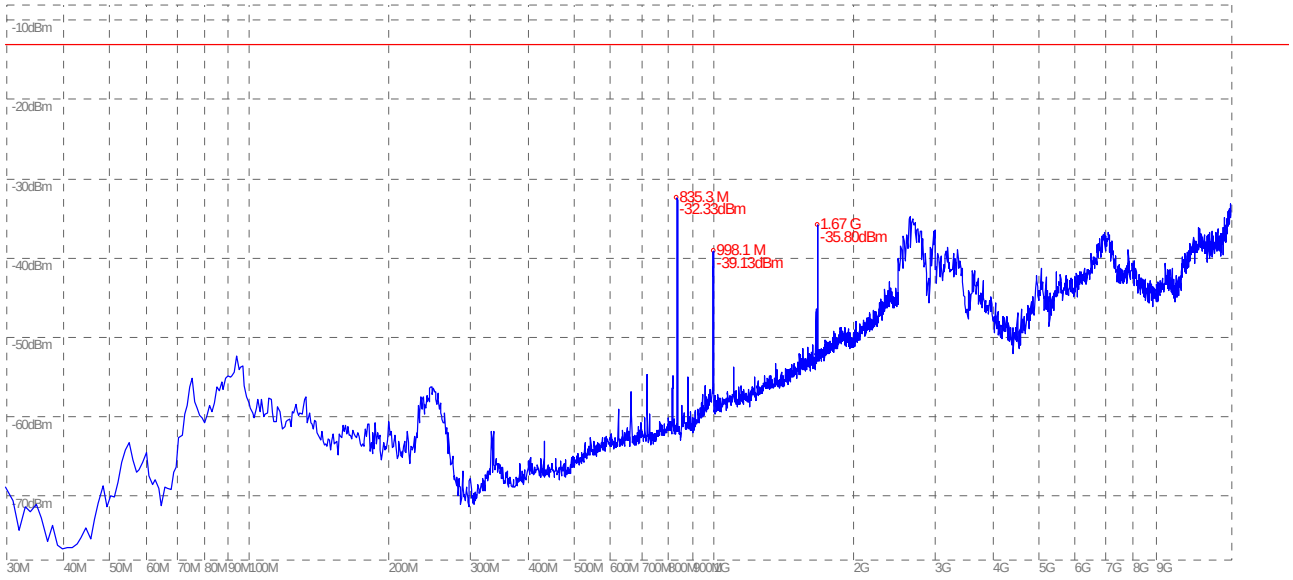
Note: the power of the EUT transmitting frequency should be ignored.



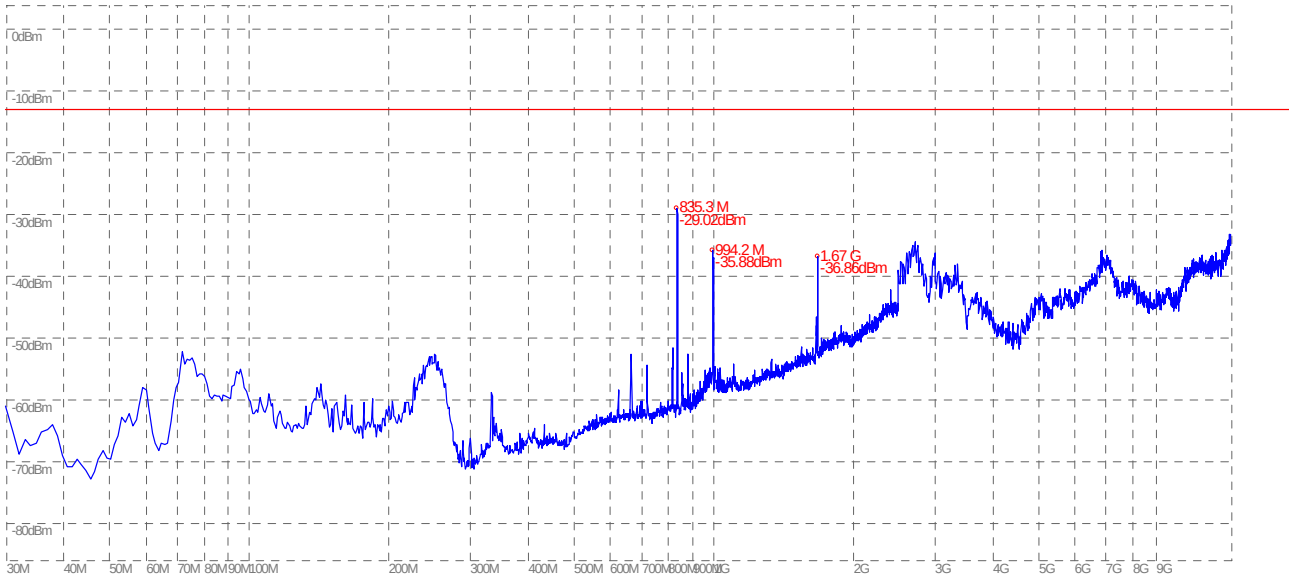
(Plot A.1: Plot when the TCH number set to 1013, Test Antenna Horizontal)



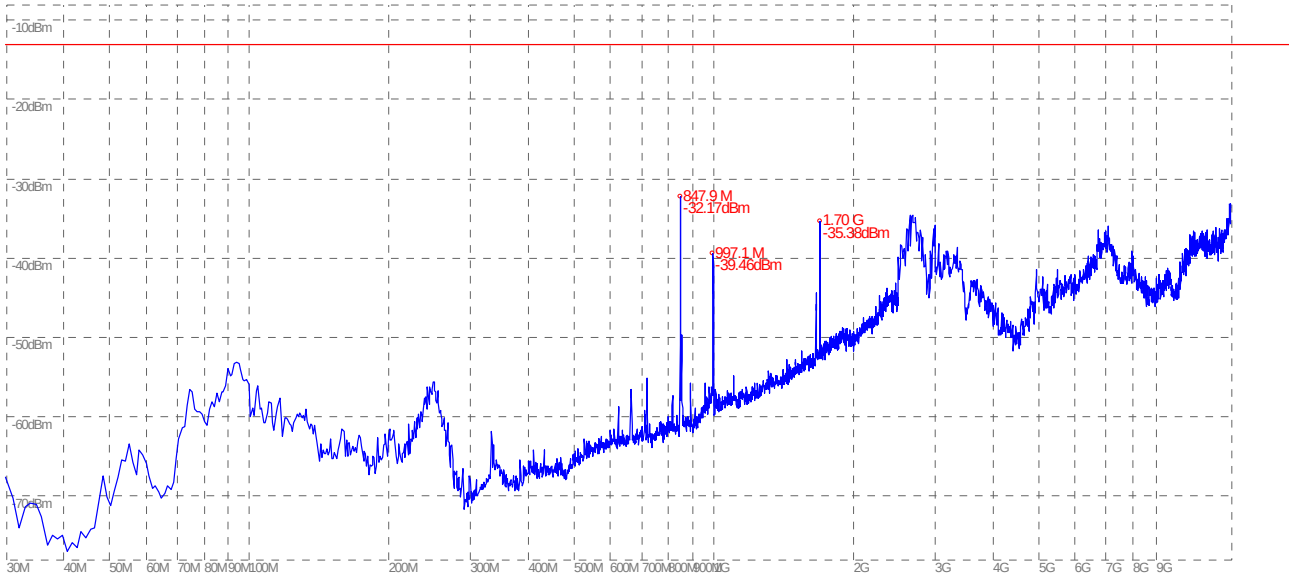
(Plot A.2: Plot when the TCH number set to 1013, Test Antenna Vertical)



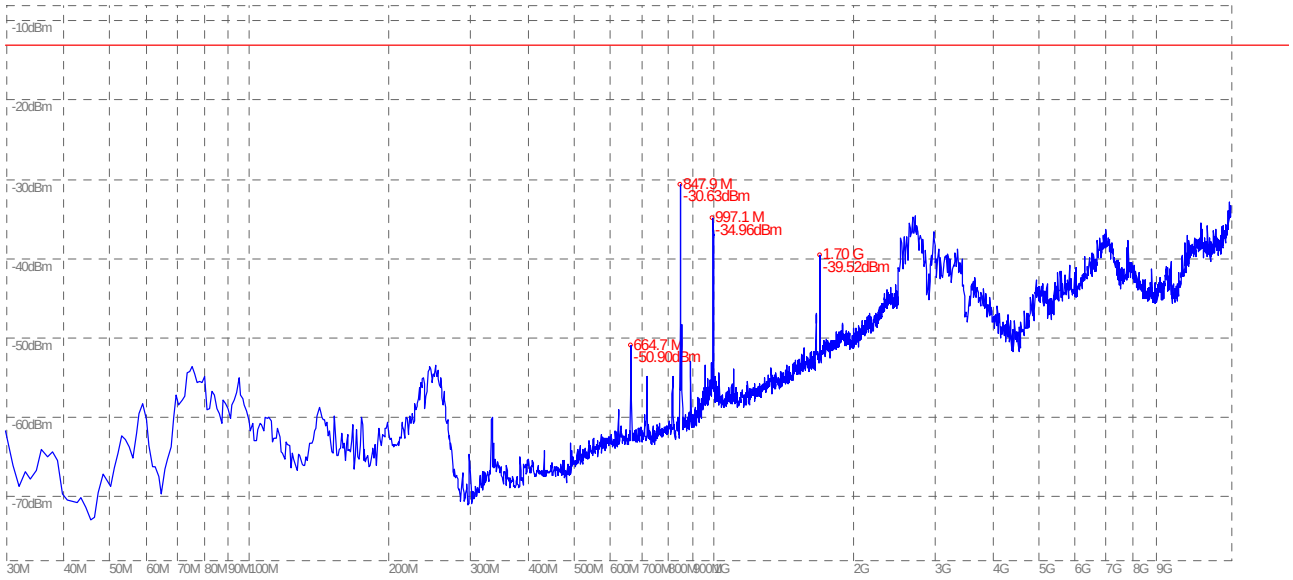
(Plot B.1: Plot when the TCH number set to 384, Test Antenna Horizontal)



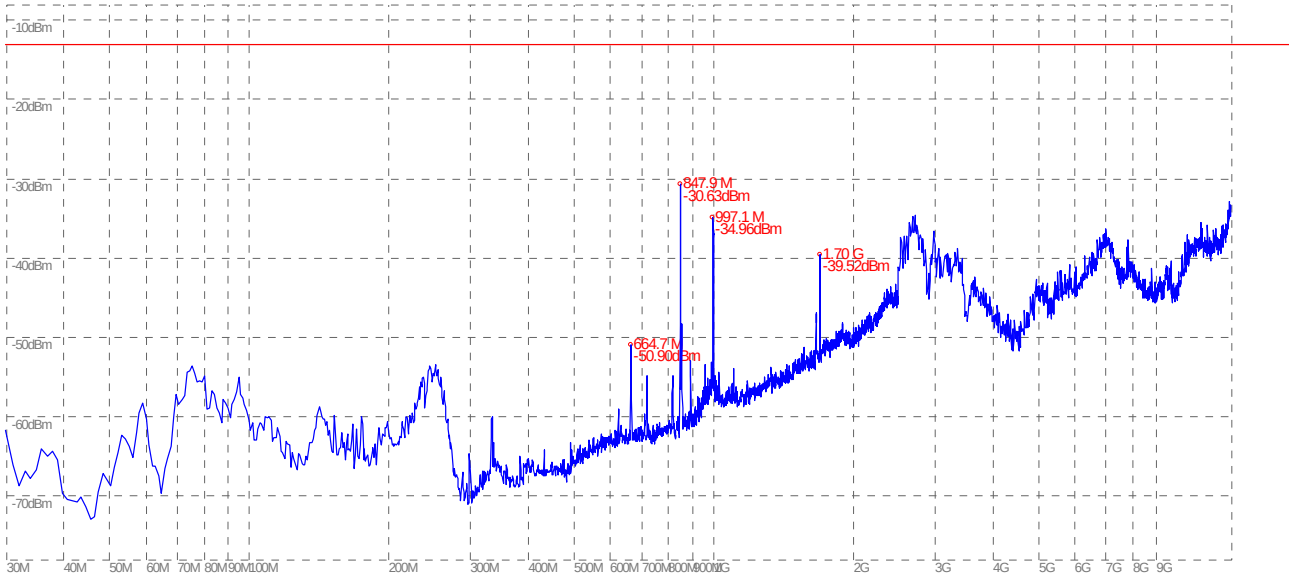
(Plot B.2: Plot when the TCH number set to 384, Test Antenna Vertical)



(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)


-10dBm
-20dBm
-30dBm
-40dBm
-50dBm
-60dBm
-70dBm
847.9 M
-30.63dBm
997.1 M
-34.96dBm
1.70 G
-39.52dBm
664.7 M
-50.90dBm
30M
40M
50M
60M
70M
80M
90M
100M
200M
300M
400M
500M
600M
700M
800M
900M
1G
2G
3G
4G
5G
6G
7G
8G
9G

3.7 Frequency Stability

3.7.1 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.

3.7.2 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 5.0V) 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 to1013 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 5.5V) 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 4.5V) and the temperature of the Temperature Chamber to normal (here used +22°C), then repeat step 3 to 8.

3.7.3 Test Result

No.	Test Conditions		Frequency Deviation at Channels Used						
	Voltage	Temperature	1013		384		777		limits
			Hz	ppm	Hz	ppm	Hz	ppm	
1	5.0V	-30°C	-15.91	-0.013	-18	-0.015	-18.2	-0.015	±2.5ppm
2		-20°C	29.93	0.0247	29.6	0.0248	28.4	0.024	
3		-10°C	8.14	0.0067	10.6	0.0088	7.95	0.007	
4		0°C	-23.16	-0.019	-24.6	-0.021	-26.3	-0.022	
5		+10°C	6.93	0.0057	5.69	0.0048	10.8	0.009	
6		+20°C	23.83	0.0197	23.8	0.0199	28.1	0.024	
7		+30°C	-24.46	-0.02	-19.6	-0.016	-24.8	-0.021	
8		+40°C	23	0.019	23.3	0.0194	21.1	0.018	
9		+50°C	-28.47	-0.023	-24.3	-0.02	-28.3	-0.024	
10	5.5V	+22°C	-15.48	-0.013	-17.5	-0.015	-18.7	-0.016	
11	4.5V	+22°C	-18.17	-0.015	-13.7	-0.011	-22.2	-0.019	
TEST Result: PASS									

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