WMD 1x Conducted Test Report

FCC Part 22 & 24 Certification	
FCC ID:	**J9CWMD1X**
Model:	**WMD P3/N10F3TWV2**

7403EBDA

STATEMENT OF CERTIFICATION

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the sample's radio frequency interference emissions characteristics as of the dates and at the times of the test under the conditions herein specified.

Test performed by:	QUALCOMM Incorporated 5775 Morehouse Drive San Diego, CA 92121-1714
Report Prepared by:	QUALCOMM Incorporated 5775 Morehouse Drive San Diego, CA 92121-1714
Approved by:	*Robert Scodellaro* Robert Scodellaro, Senior Staff Engineer
Tests that required an OATS site were performed by Nemko Product Services.	

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Table of Contents

1. Introduction and Purpose

This document provides the FCC test data for the Qualcomm Wearable Mobile Device (WMD) 1x module. The tests included in this report are limited to all conducted tests required. The radiated tests were performed at Nemko USA, Inc. in San Diego, CA, and are reported in a separate document.

2. Description of Device Under Test

The Wearable Mobile Device (WMD) 1x is an ultra small, 21 x 22 x 4.5 mm WWAN module that can be integrated into a multitude of host devices. The WMD 1x module operates on the 800/1900 MHz CDMA2000 1x networks. The module uses Qualcomm's QSC 6055 chip set and has stand alone GPS, AGPS, gpsOneXTRA-tm and Bluetooth 2.0 technologies. Interfaces for the module include USB 2.0, Bluetooth 2.0, I2C, RUIM support, LCD, camera, keypad, 2 LED control lines, vibrator control, audio and primary RF coax. HTT is designed to be placed in a user's bag or attached to a belt or other article of clothing. The WMD design is optimized for minimal cost, minimal size, maximum battery life and superb position location performance. The WMD 1x device meets the following standards: IS-2000 for CDMA 1xRTT, IS-707-A Data, IS-637-B SMS, IS-683-A Service provisioning, gpsOne and IS-98 CDMA Minimum Performance.

Only 850 MHz (Cellular) and 1900 MHz (PCS) bands are used for operation. The DUT is a pre-production sample.

3. Test Summary

FCC/IC Rule	Description of Test	Result	Page
§2.1046	RF Power Output	**Complies**	3
§2.1049	Occupied Bandwidth	**Complies**	6
§22.359, 24.238	Block Edge Requirement	**Complies**	11
§2.1051, 22.917, 24.238(a)	Out of Band Emission at Antenna Terminals	**Complies**	14
§2.1055, 22.355, 24.235	Frequency Stability vs. Temperature vs. Voltage	**Complies**	19
§1.1310, 2.1091	RF Exposure		See Exhibit 4
§2.1053, 22.917. 24.238(a)	Field Strength of Spurious Radiation	**Complies**	See Exhibit 3

4. RF Power Output Verification

FCC:	§ 2.1046 , 24.232(d)
Limit:	n/a
DUT SN	WMD N10F3TWV2 ESN 7403EBDA

4.1 Base Station Emulator Settings and Measurement Procedures

As shown in the figure below, connect the transmitter output of the WMD 1x module to the communication test set 8960 and configure it to operate at maximum power in a call. Measure the power at three equally spaced operating frequencies for each band.

Use the build-in power measurement capability in the Agilent 8960 box to measure CDMA 1x conducted power outputs. The relevant cable loss is measured for the specific frequencies under test and added as a correction factor for all the tests.

4.1.1 For CDMA2000 1x

Measure the power at Ch1013, 384 and 777 for US cell; Ch25, 600 and 1175 for US PCS band.

1xRTT

Use CDMA2000 Rev 6 protocol in the call box 8960.

1) Test for Reverse/Forward TCH RC1 and RC3 Reverse FCH and demodulation of RC 3.

    a. Set up a call using Fundamental Channel Test Mode 1 (RC1, SO 2) with 9600 bps data rate only.

    b. As per C.S0011 or TIA/EIA-98-F Table 4.4.5.2-1, set the test parameters as shown in Table 4-1.

    c. Send continuously '0' power control bits to the WMD module.

    d. Measure the output power at inGeo1AW antenna connector as recorded on the power meter with values corrected for cables losses.

    e. Repeat step b through d for Fundamental Channel Test Mode:

        i. RC3, SO55

Table 4-1 Parameters for Max. Power with a single traffic code channel, SR1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\dfrac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\dfrac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

4.2 Test Results

CDMA2000 1x

Mode Conducted Power	Test Case			Cell Channel			PCS Channel		
	#	FWD RC/TAP	REV RC/TAP	1013	384	777	25	600	1175
	1	RC3	RC3 (SO55)	24.5	24.6	24.3	24.1	24.3	24.2

Mode Conducted Power PAR	Test Case			Cell Channel			PCS Channel		
	#	FWD RC/TAP	REV RC/TAP	1013	384	777	25	600	1175
	1	RC3	RC3 (SO55)	N/A	N/A	N/A	3.65	3.80	3.72

5. Occupied Bandwidth

FCC:	§2.1049
Limit:	n/a
DUT SN	WMD N10F3TWV2 ESN 7403EBDA
Modes Tested	CDMA 1x
	▪ RC3 SO55

5.1 Test Procedures

As Figure below indicates, the WMD module was connected to the call simulator test box through a calibrated coaxial cable and directional coupler. The coupled port of the coupler was connected to the spectrum analyzer. Occupied bandwidth (defined as the 99% power bandwidth) was measured using the PSA internal measurement personality feature.

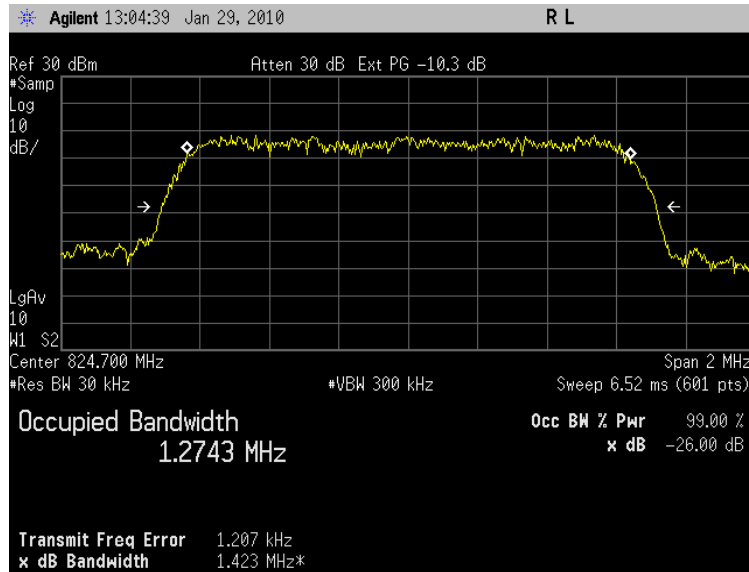Testing was completed using the Agilent 8960 for the CDMA 1x measurement.
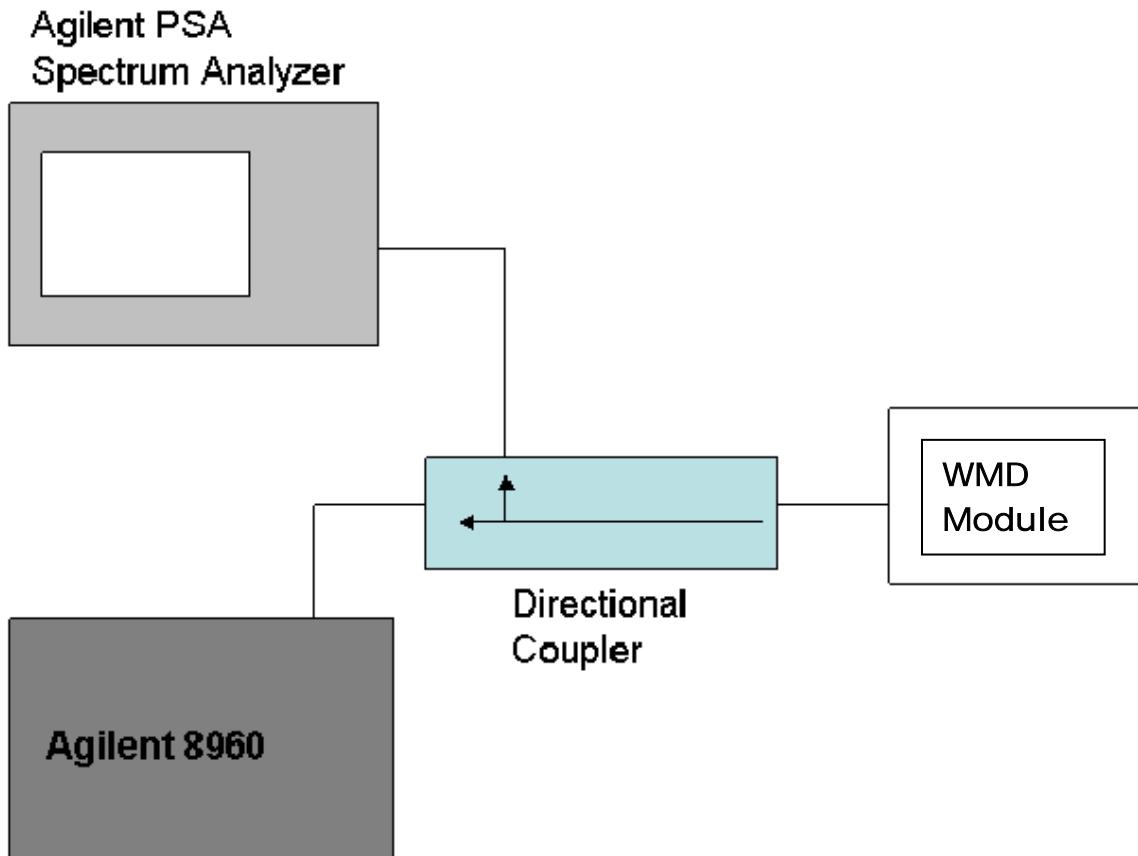
5.2 Test Results

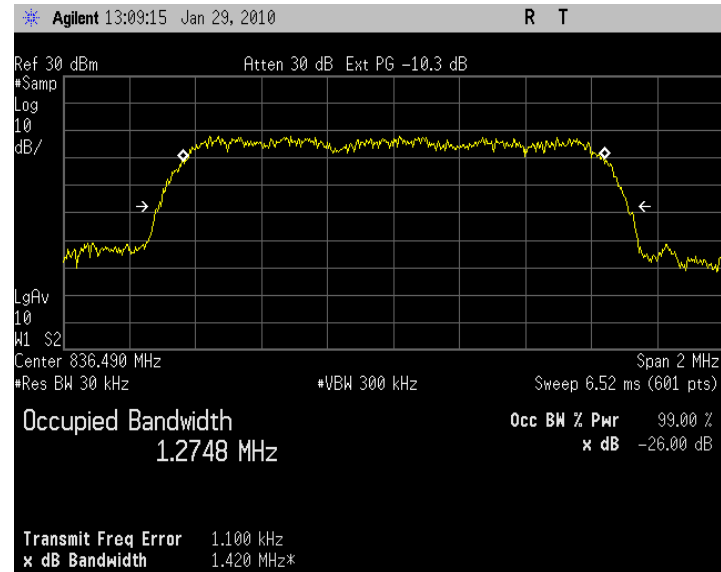The occupied bandwidth was measured at low, mid and high channel in each band.

Mode		Frequency (MHz)	Channel	99% Occupied Bandwidth (MHz)	Plot number
CDMA1x/ 1x-EVDO	**RC3 SO55**	824.7	1013	1.2743	Plot 5.2 – 1
		836.52	384	1.2748	Plot 5.2 – 2
		848.31	777	1.2703	Plot 5.2 – 3
		1851.25	25	1.2767	Plot 5.2 – 4
		1880	600	1.2808	Plot 5.2 – 5
		1908.75	1175	1.2793	Plot 5.2 – 6

5.3 Plots

Plot 5.2 - 1 (Ch1013, RC3 SO55)

```
Agilent 13:04:39  Jan 29, 2010                          R L
Ref 30 dBm                  Atten 30 dB  Ext PG -10.3 dB
#Samp
Log
10
dB/



LgAv
10
W1 S2
Center 824.700 MHz                                    Span 2 MHz
#Res BW 30 kHz              #VBW 300 kHz      Sweep 6.52 ms (601 pts)

Occupied Bandwidth                  Occ BW % Pwr      99.00 %
            1.2743 MHz                  x dB    -26.00 dB


Transmit Freq Error    1.207 kHz
x dB Bandwidth         1.423 MHz*
```

Plot 5.2 - 2 (Ch384, RC3 SO55)

```
Agilent 13:09:15  Jan 29, 2010                          R  T
Ref 30 dBm                  Atten 30 dB  Ext PG -10.3 dB
#Samp
Log
10
dB/



LgAv
10
W1 S2
Center 836.490 MHz                                    Span 2 MHz
#Res BW 30 kHz              #VBW 300 kHz      Sweep 6.52 ms (601 pts)

Occupied Bandwidth                  Occ BW % Pwr      99.00 %
            1.2748 MHz                  x dB    -26.00 dB


Transmit Freq Error    1.100 kHz
x dB Bandwidth         1.420 MHz*
```

Plot 5.2 - 3 (Ch777, RC3 SO55)

```
Agilent 13:26:25  Jan 29, 2010                          R L
Ref 30 dBm                  Atten 30 dB  Ext PG -10.3 dB
#Samp
Log
10
dB/



LgAv
10
W1 S2
Center 848.310 MHz                                    Span 2 MHz
#Res BW 30 kHz              #VBW 300 kHz      Sweep 6.52 ms (601 pts)

Occupied Bandwidth                  Occ BW % Pwr      99.00 %
            1.2703 MHz                  x dB    -26.00 dB


Transmit Freq Error    -2.309 kHz
x dB Bandwidth         1.421 MHz*
```

Plot 5.2 -4 (Ch 25, RC 3 SO5 5)

Plot 5.2 - 5 (Ch 600, RC 3 SO5 5)
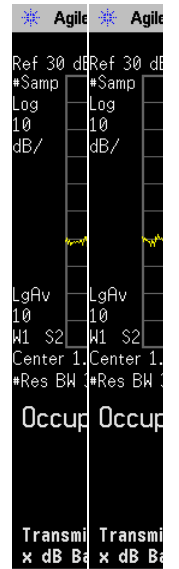
Plot 5.2 - 6 (Ch 117 5, RC 3 SO5 5)
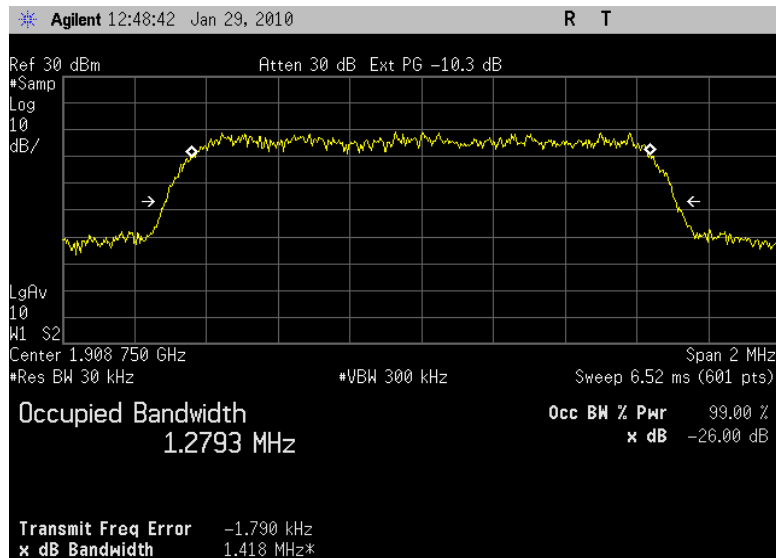
6. Block Edge Compliance

| FCC:	§22.359, 24.238	
Limit:	-13dBm	
DUT SN	WMD N10F3TWV2 ESN 7403EBDA	
Modes Tested	CDMA 1x	
	▪ RC3 SO55	

6.1 Test Procedures

As Figure below indicates, the WMD 1x module was connected to the call simulator test box through a calibrated coaxial cable and directional coupler. The coupled port of the coupler was connected to the spectrum analyzer. Block edge emissions were measured at the required operating frequencies in each band on the spectrum analyzer.

For Each block edge measurement:

- Set the spectrum analyzer span to include the block edge frequency (824, 848, 1850, 1910MHz)
- Set a marker to point the corresponding block edge frequency in each test case
- Set display line at -13dBm
- Set resolution bandwidth to at least 1% of emission BW
- Set video averaging to 10 samples
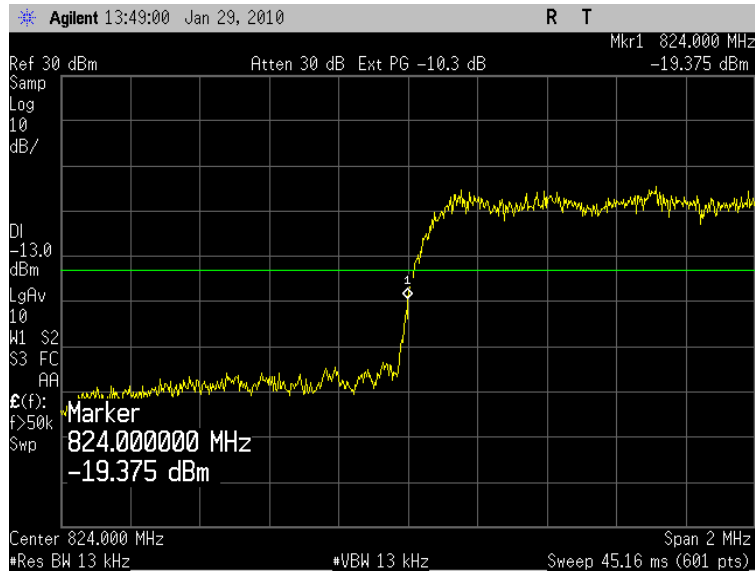
Testing was completed using the Agilent 8960 for CDMA 1x.
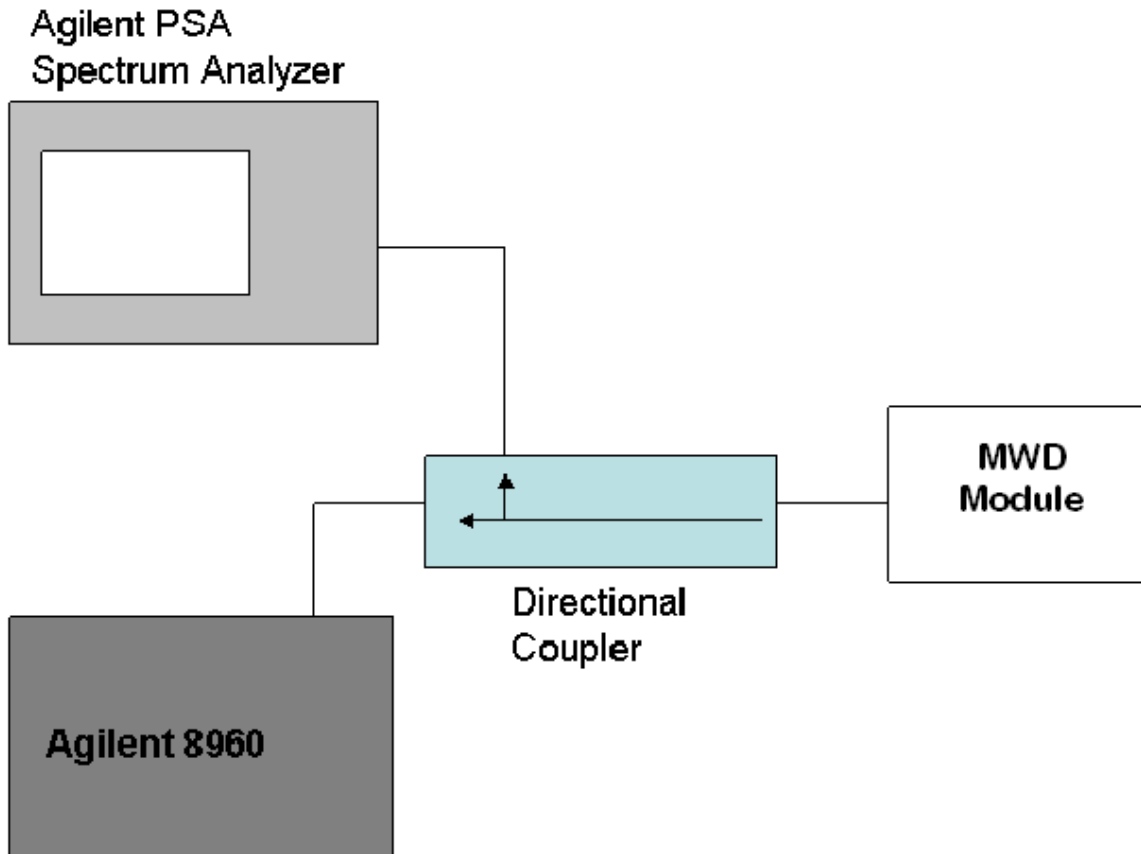
6.2 Test Results

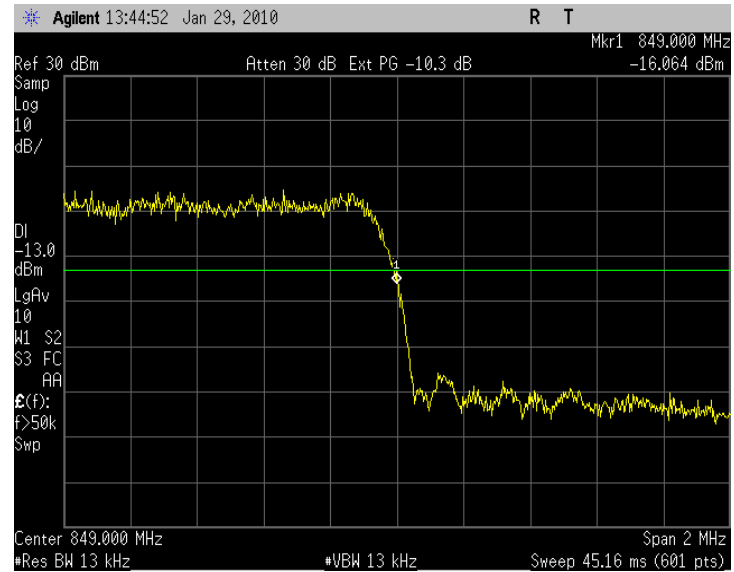The test was conducted at block edges in each band

Mode		Frequency (MHz)	Channel Tested	Corresponding Plot number	Test Result
CDMA 1x	RC3 SO55	824	1013	Plot 6.2 - 1	Complies
		849	777	Plot 6.2 - 2	Complies
		1850	25	Plot 6.2 - 3	Complies
		1910	1175	Plot 6.2 - 4	Complies

6.3 Plots

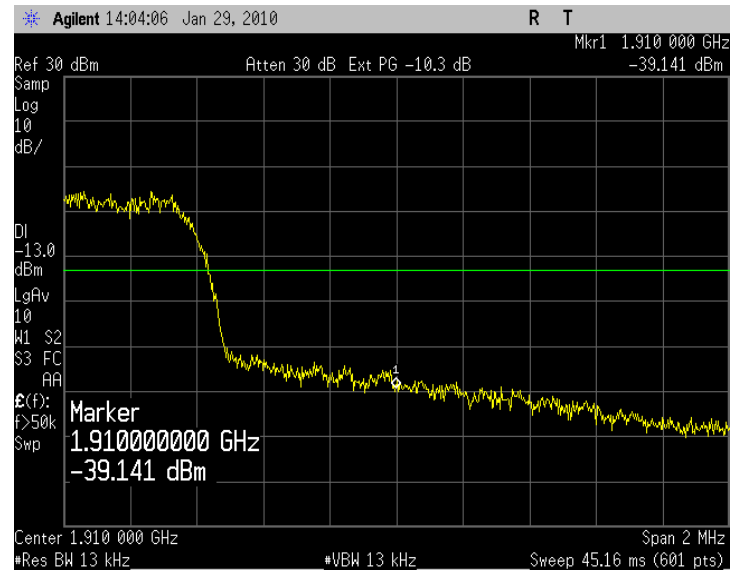Plot 6.3 -1 (Ch1013, RC3 SO55)

Plot 6.3-2 (Ch777, RC3 SO55)


Plot 6.3-3 (Ch25, RC3 SO55)
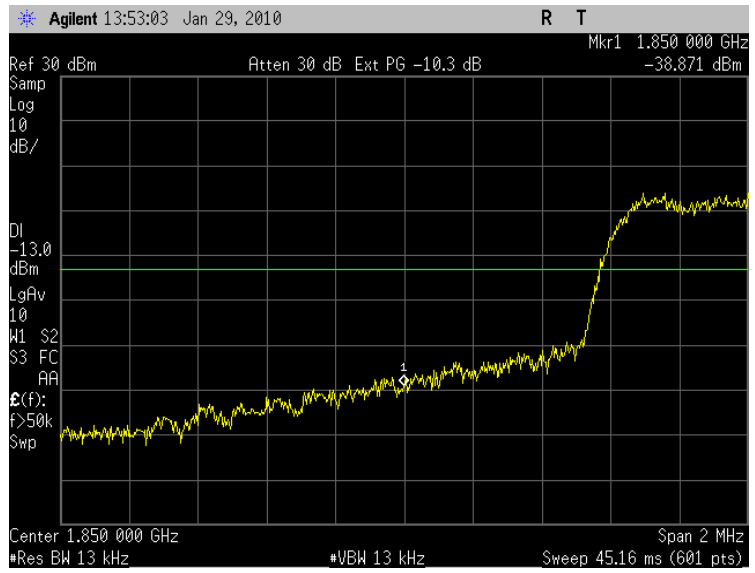
Plot 6.3-4 (Ch1175, RC3 SO55)

7. Out of Band Emission at Antenna Terminals

FCC:	§22.901(d), 22.917, 24.238 (a)	
Limit:	-13dBm	
DUT SN	WMD N10F3TWV2 ESN 7403EBDA	
Modes Tested	CDMA 1x	
	RC3 SO55	

7.1 Test Procedure

As Figure below indicates, the WMD 1x module was connected to the call simulator test box through a calibrated coaxial cable and directional coupler. The coupled port of the coupler was connected to the spectrum analyzer. The PSA was used to scan the out-of-band emission up to 10th harmonics. RBW and VBW were set to 100kHz for measurements below 1GHz and 1MHz for testing above 1GHz. Recorded multiple sweeps in maximum hold mode using a peak detector to ensure that the worst case emission were caught.

Testing was completed using the Agilent 8960 for CDMA 1x measurement testing.
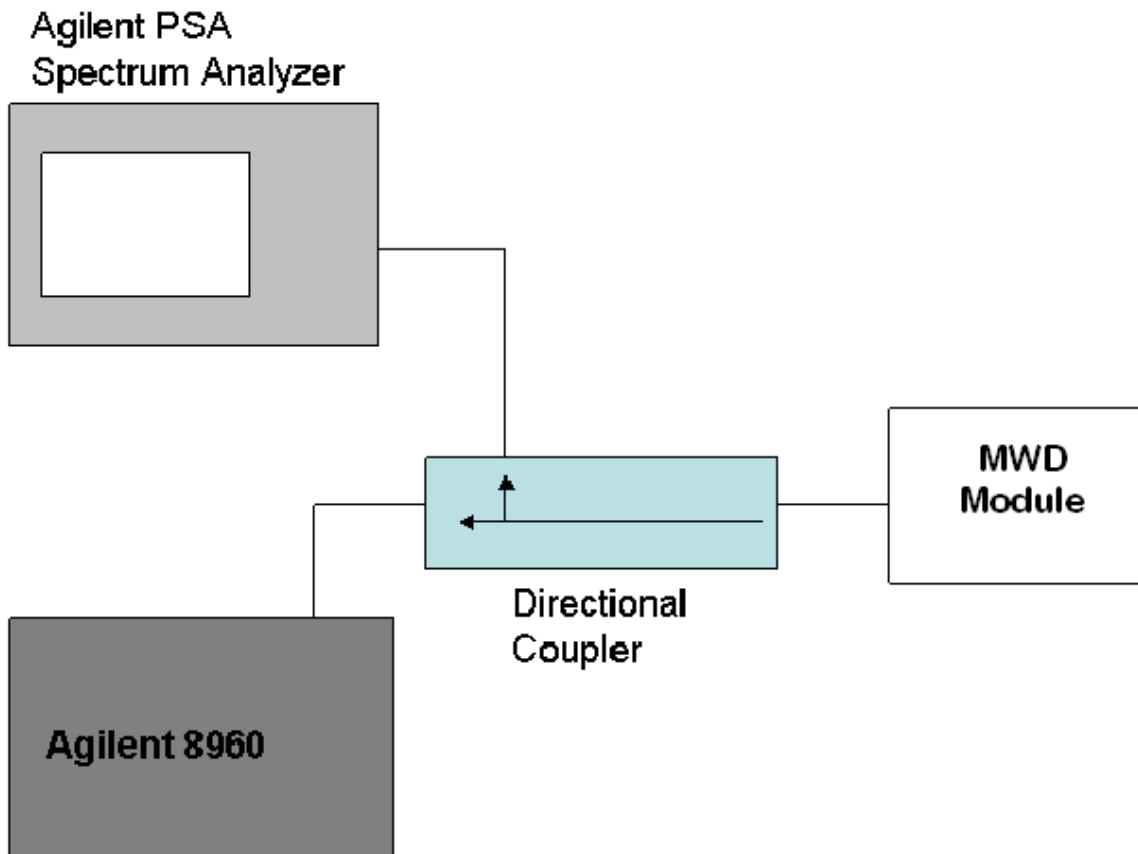
7.2 Test Result

The test was conducted at low, mid and high channel in each band.

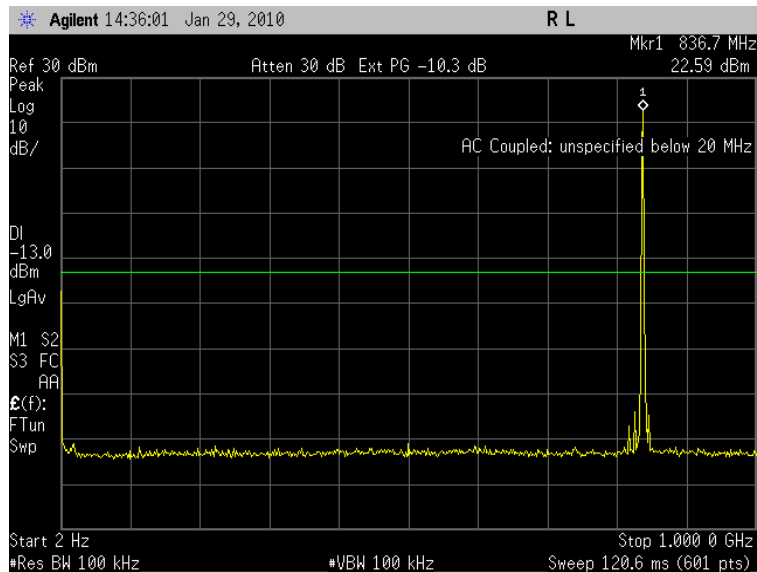| Mode		Frequency (MHz)	Channel Tested	Corresponding Plot number	Test Result
CDMA1x	RC3 SO55	0 ~ 20 GHz	1013	Plot 7.2 – 1,2	Complies
		0 ~ 20 GHz	384	Plot 7.2 – 3,4	Complies
		0 ~ 20 GHz	777	Plot 7.2 – 5,6	Complies
		0 ~ 20 GHz	25	Plot 7.2 – 7,8	Complies
		0 ~ 20 GHz	600	Plot 7.2 – 9,10	Complies
		0 ~ 20 GHz	1175	Plot 7.2 – 11,12	Complies

7.3 Plots

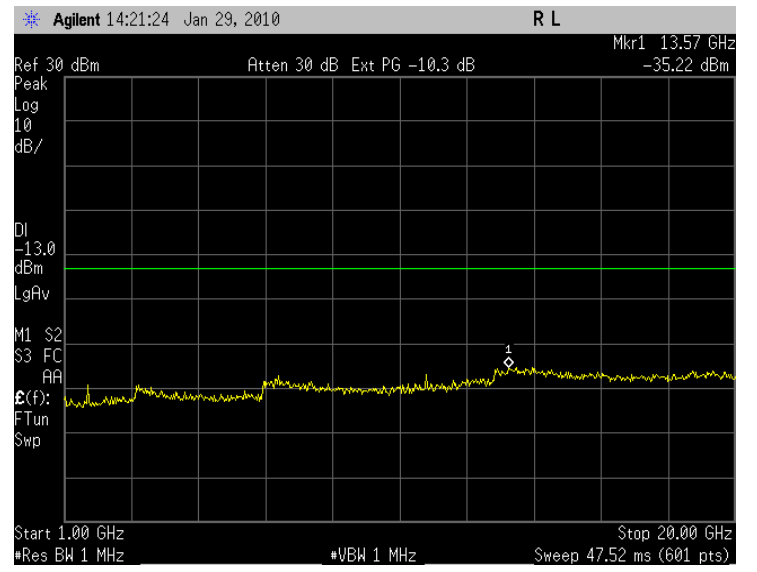Plot 7.3 -1 (Ch1013, RC3 SO55)
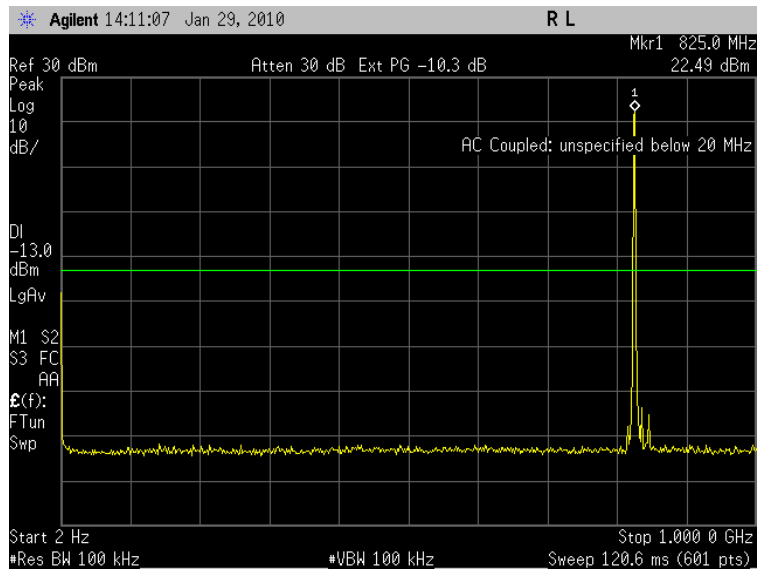
Plot 7.3-2 (Ch1013, RC3 SO55)
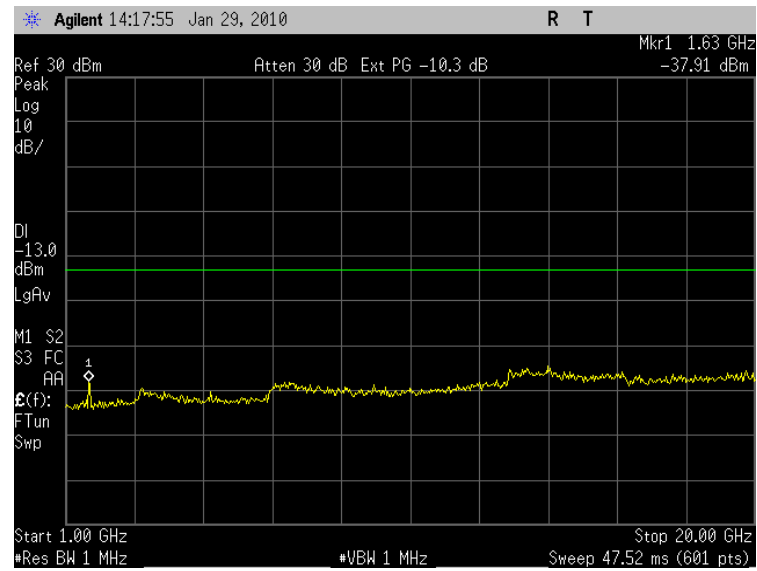
Plot 7.3-3 (Ch383, RC3 SO55)

Plot 7.3-4 (Ch383, RC3 SO55)

Plot 7.3 -5 (Ch777, RC3 SO55)	Plot 7.3-6 (Ch777, RC3 SO55)
Plot 7.3-7 (Ch25, RC3 SO55)	Plot 7.3-8 (Ch25, RC3 SO55)

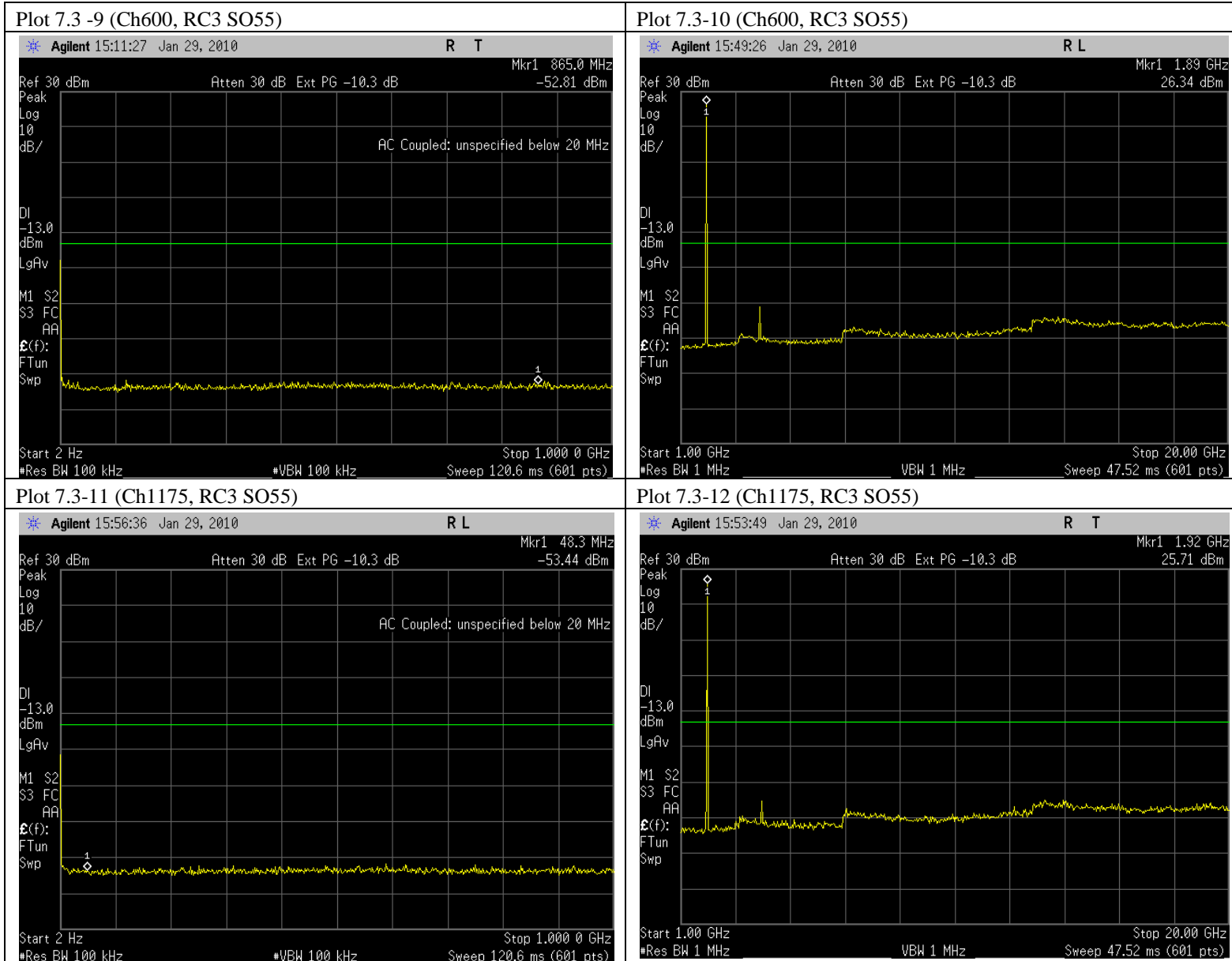| Plot 7.3 -9 (Ch600, RC3 SO55)	Plot 7.3-10 (Ch600, RC3 SO55)
Plot 7.3-11 (Ch1175, RC3 SO55)	Plot 7.3-12 (Ch1175, RC3 SO55)
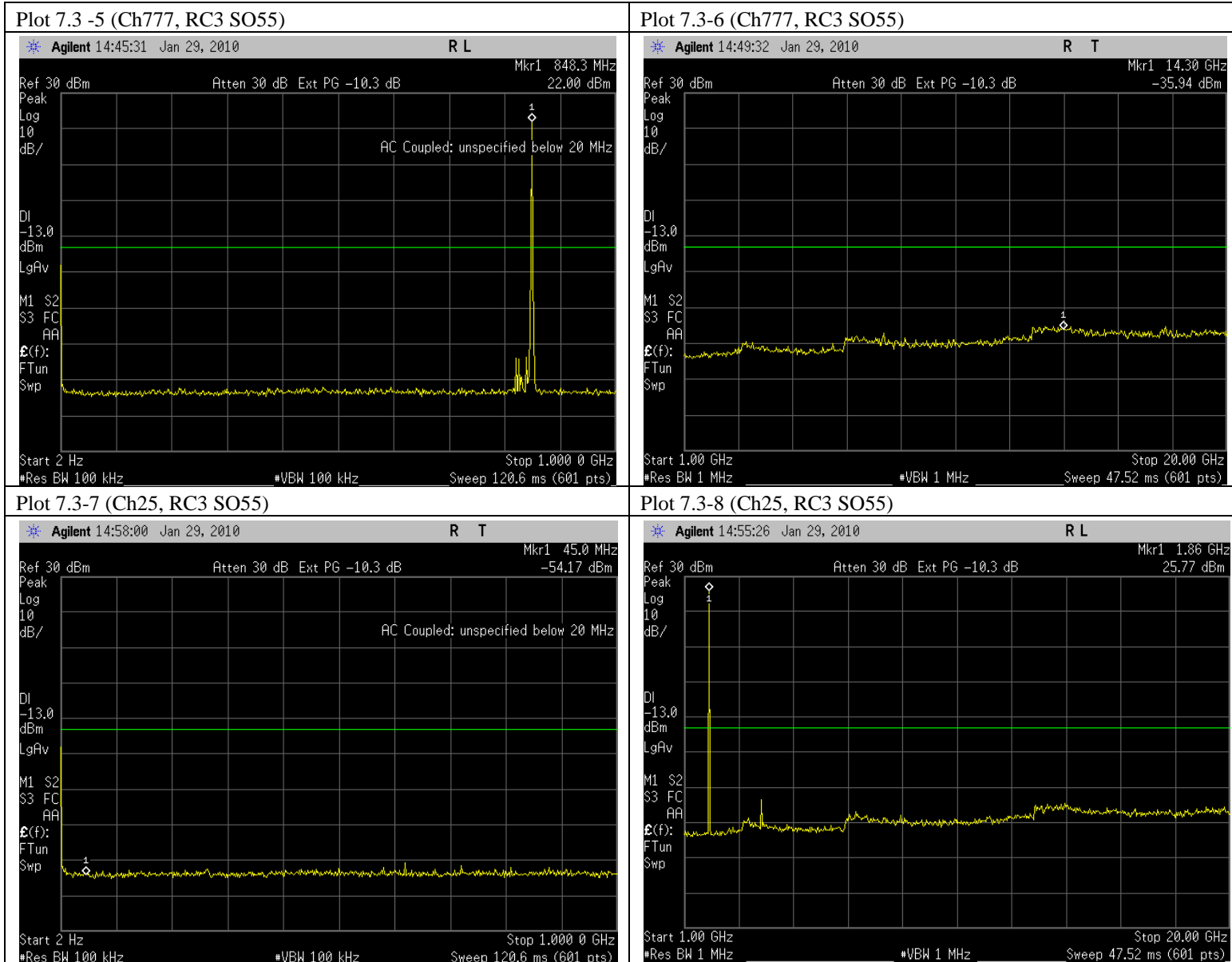
8. Frequency Stability

FCC:	§2.1055, 22.355, 24.235
Limit:	±2.5ppm
DUT SN	WMD N10F3TWV2 ESN 7403EBDA
Modes Tested	CDMA 1x
	RC3 SO55

8.1 Test Procedure

As the test setup indicates, WMD 1x module was placed inside the temperature chamber. Transmitting frequency error was measured at 20 degrees C with DC voltage varying from 3.2 volts to 4.2 volts, and then set the temperature to -30 degrees C and allow it to stabilize. After 1 hour soak time, the transmitting frequency error measurement was recorded at -30 degrees. The process was repeated at an incremental of 10 degrees C until +60 degrees C is completed.

Testing was completed using the Agilent 8960 for CDMA 1x.
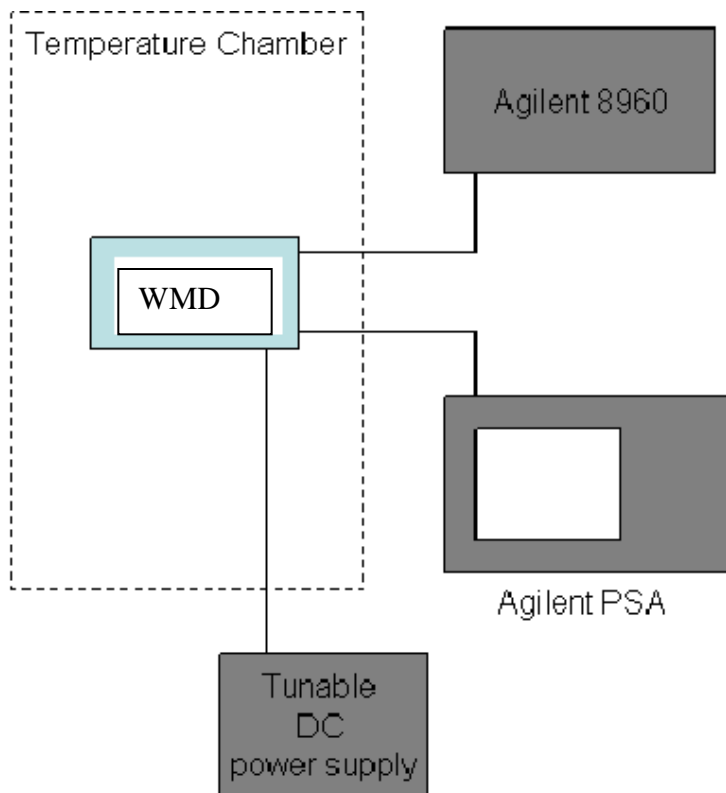
8.2 Test Results

The test was conducted at mid channel in each band.

| Operation Mode:	CDMA 1x	Channel:	383
Tx Frequency:	836.49MHz	Voltage:	3.7v (3.4v ~ 4.2v)
Limit:	±2.5ppm (±2091Hz)		

Carrier Frequency Reference at 25 Degrees C: 836490692 Hz

| | variation from carrier frequency reference (Hz) | | | | | | specification | |
| | | | | | | | lower limit | upper limit |
temp (C)	3.4V	3.6V	3.7V	3.8V	4.0V	4.2V		
-30	243	206	194	187	184	178	-2091	2091
-20	224	210	200	191	187	180	-2091	2091
-10	158	129	122	120	115	112	-2091	2091
0	74	66	63	60	105	59	-2091	2091
10	79	58	69	59	54	95	-2091	2091
20	100	94	112	104	92	103	-2091	2091
30	84	106	71	91	94	45	-2091	2091
40	16	30	46	-14	-14	-14	-2091	2091
50	-120	-136	-152	-165	-193	-214	-2091	2091
60	14	95	107	59	82	102	-2091	2091

Carrier Frequency Stability
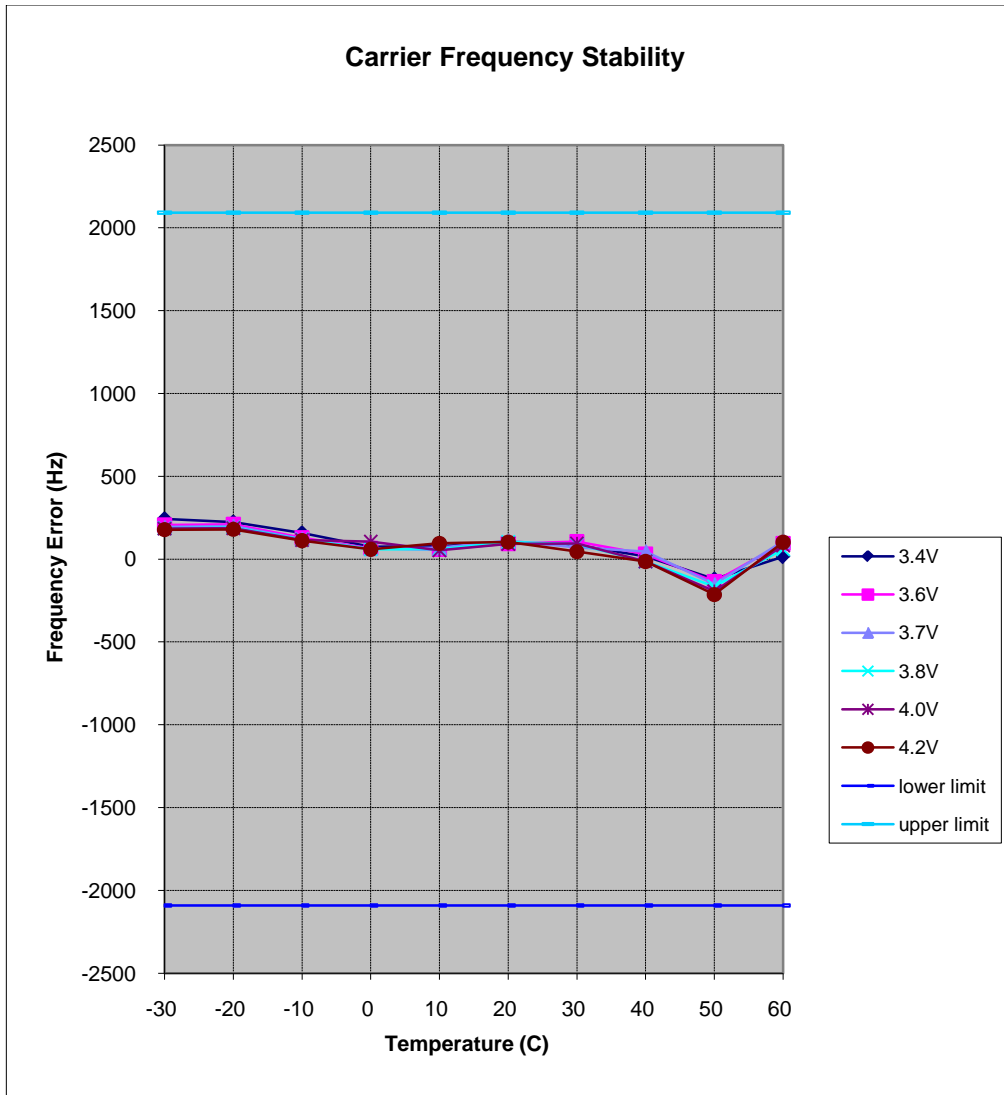
Operation Mode:	CDMA 1x PCS	Channel:	600
Tx Frequency:	1880MHz	Voltage:	3.7v (3.4v ~ 4.2v)
Limit:	±2.5ppm (±4700Hz)		

temp. (C)	transmitter carrier frequency (MHz)						specification	
	3.4V	3.6V	3.7V	3.8V	4.0V	4.2V	lower limit	upper limit
-30	-412	-278	-345	-345	-345	-345	-4700	4700
-20	-572	-505	-505	-502	-1472	-1460	-4700	4700
-10	355	438	405	388	372	438	-4700	4700
0	255	472	222	205	188	241	-4700	4700
10	122	88	188	155	238	222	-4700	4700
20	238	272	238	222	238	220	-4700	4700
30	155	122	72	38	38	55	-4700	4700
40	-112	-62	-128	-122	-28	-45	-4700	4700
50	-95	-128	-162	-345	-395	-395	-4700	4700
60	-778	-812	-912	-962	-945	-962	-4700	4700

Carrier Frequency Stability
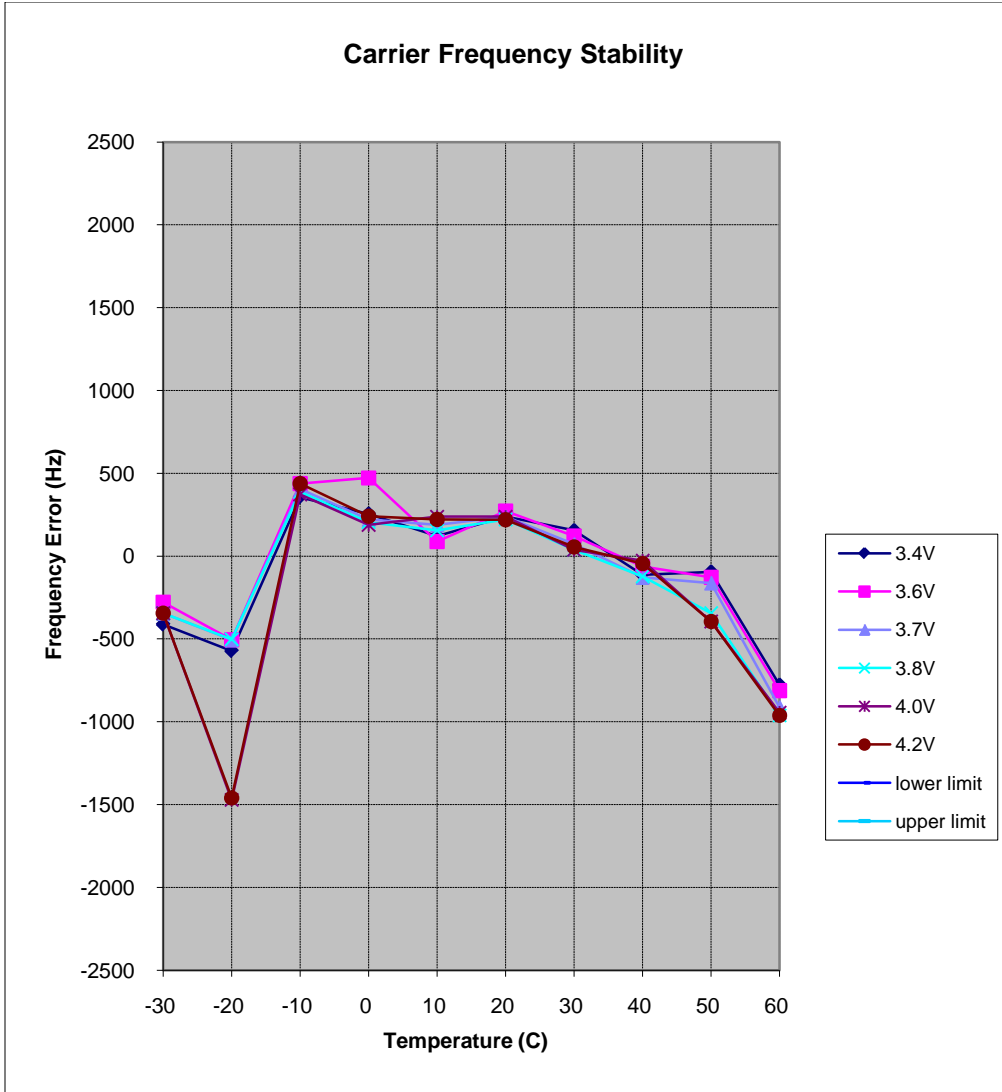
9. Test Equipment and Firmware

The following test equipments were used.

Model	Manufacturer	Description	S/N	Cal Data	Cal Due Date
8960 Series 10 E5515C	Agilent	Wireless Communication Set	K121532	07/17/2010	07/17/2010
E4440A PSA Series	Agilent	Spectrum Analyzer	K130220	04/07/2009	04/07/2010
Model 105	TestEquity	Temperature Chamber	K141144	09/22/2009	09/22/2010

The firmware built in the 8960 was used to test the WMD 1x module.

Call Box	Technology	Firmware Rev
8960	1x	B.12.21