6 - MODULATION CHARACTERISTIC

6.1 Applicable Standard

Requirement: FCC § 2.1047, § 22.915(a)

6.2 Test Procedure

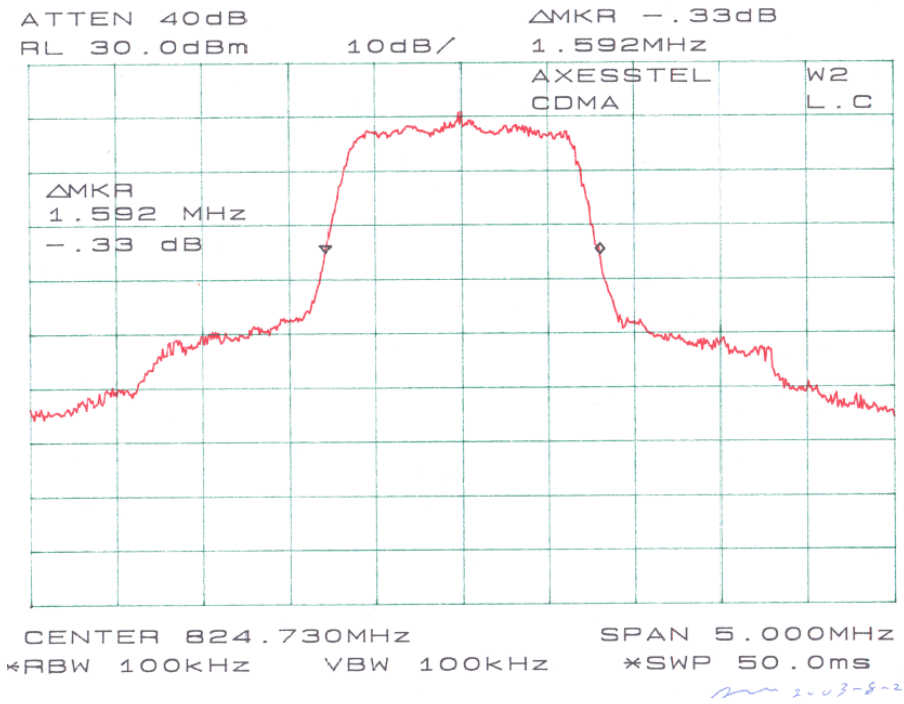
CDMA digital mode is used by EUT.

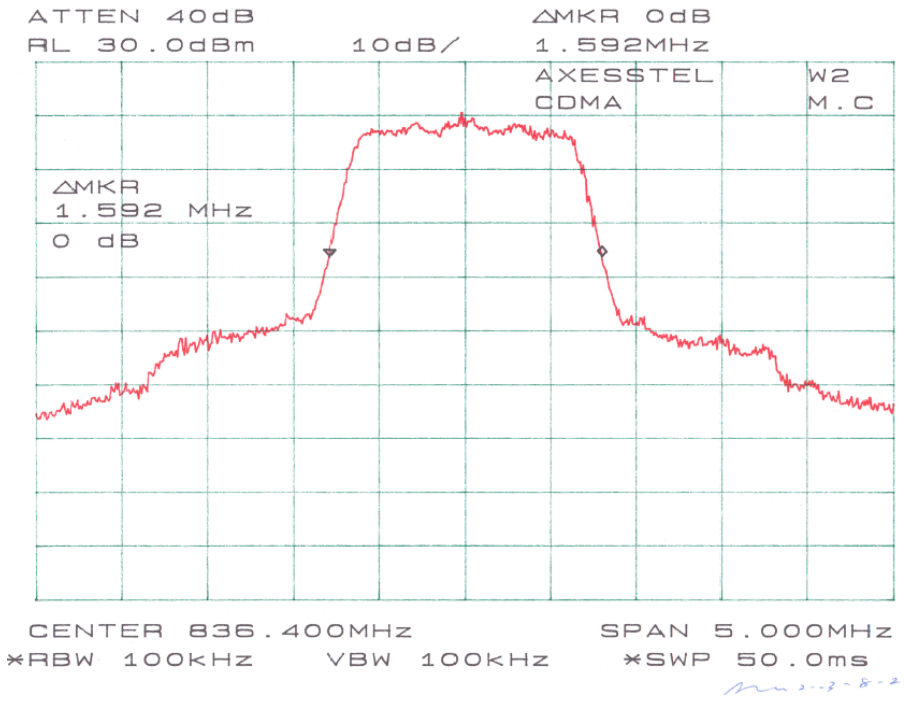
6.3 Test Equipment

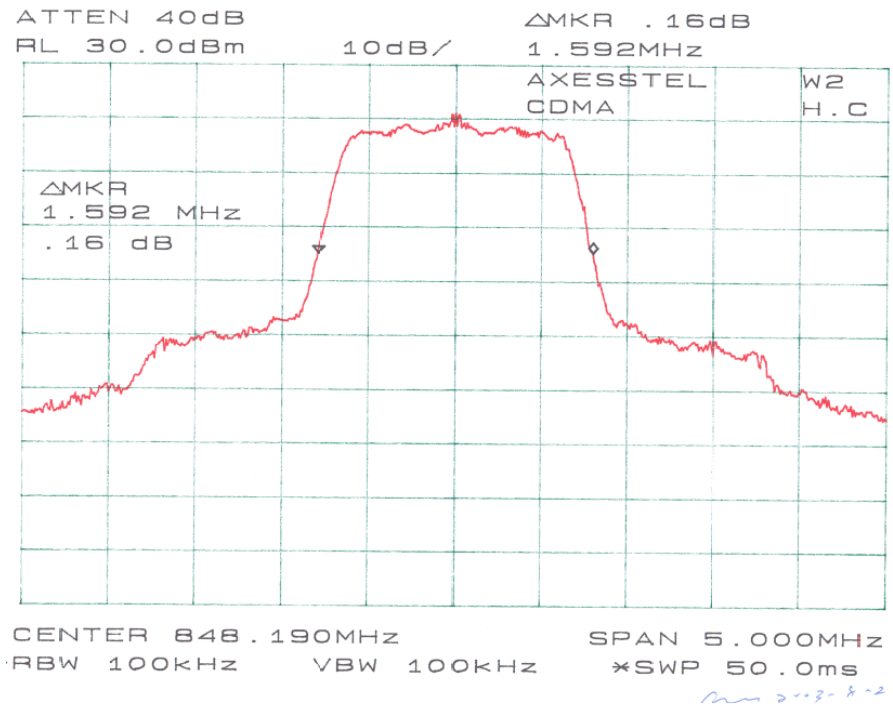
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

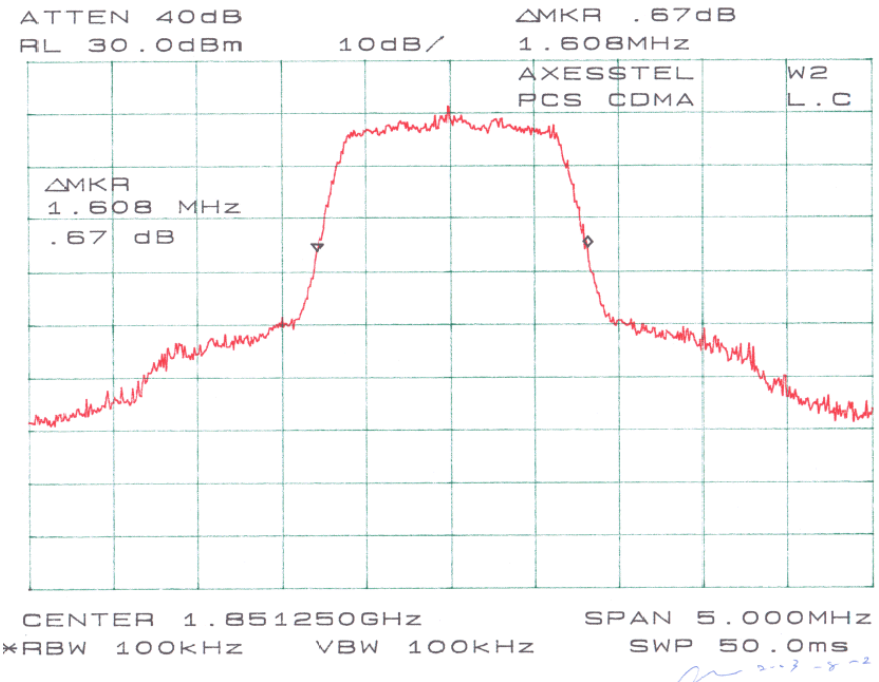
6.4 Test Results

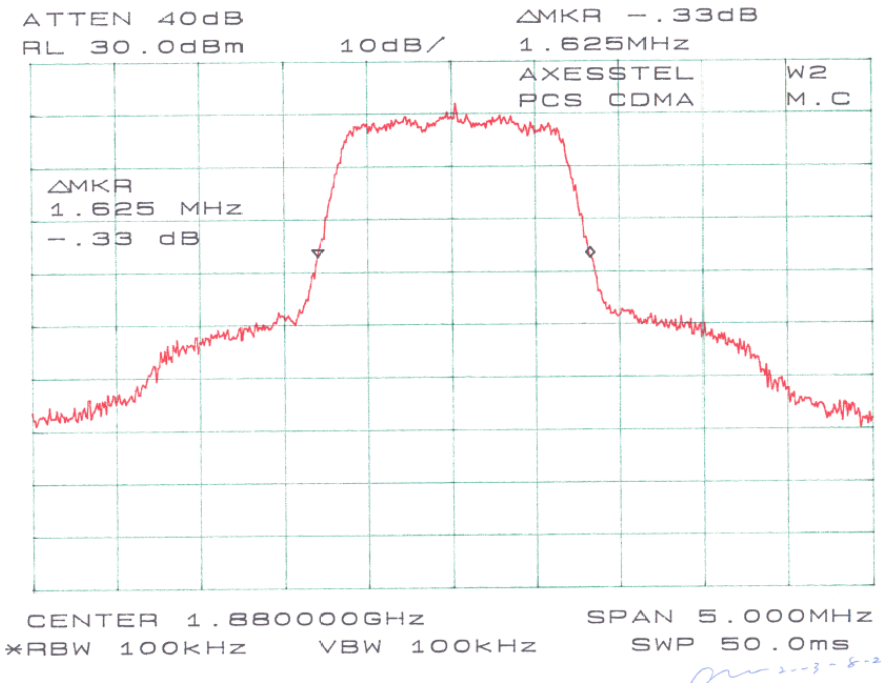
Please refer to the hereinafter plots.

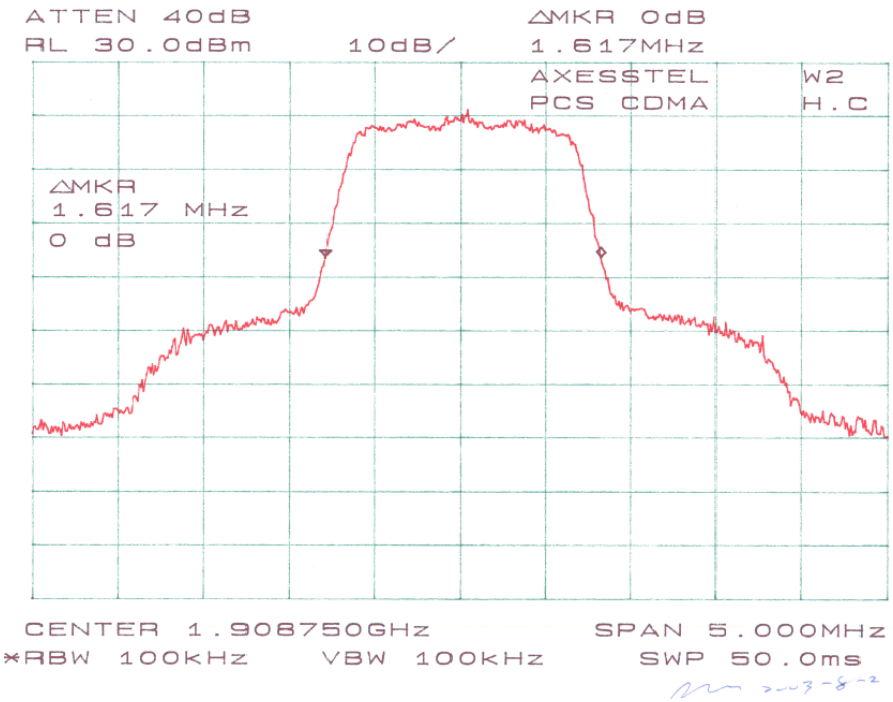

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.33dB
1.592MHz
AXESSTEL
CDMA
W2
L.C
ΔMKR
1.592 MHz
-.33 dB
CENTER 824.730MHz
SPAN 5.000MHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms

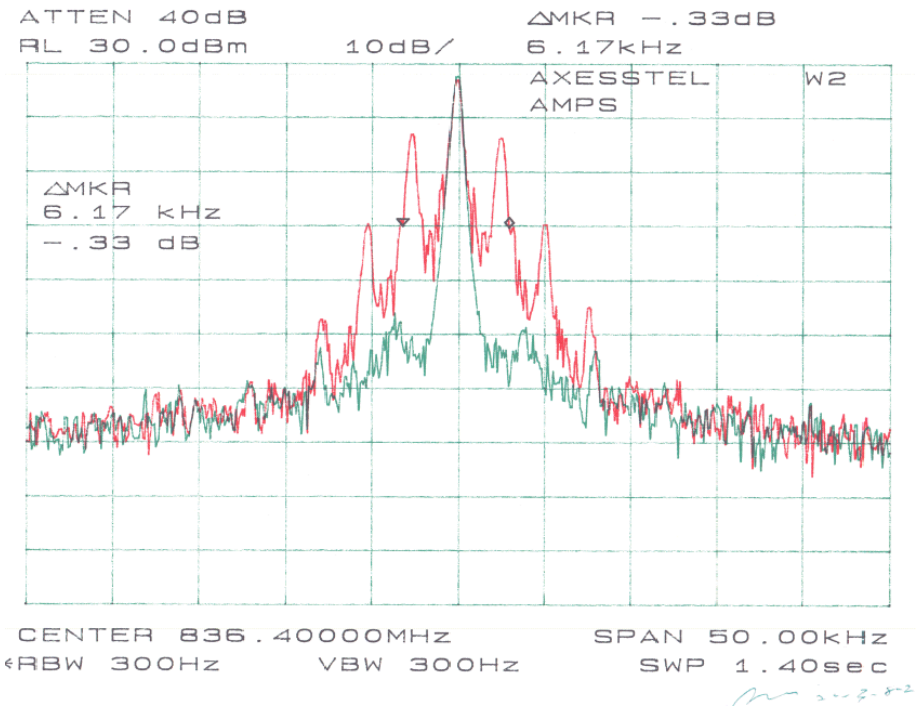

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR 0dB
1.592MHz
AXESSTEL
CDMA
W2
M.C
ΔMKR
1.592 MHz
0 dB
CENTER 836.400MHz
SPAN 5.000MHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms

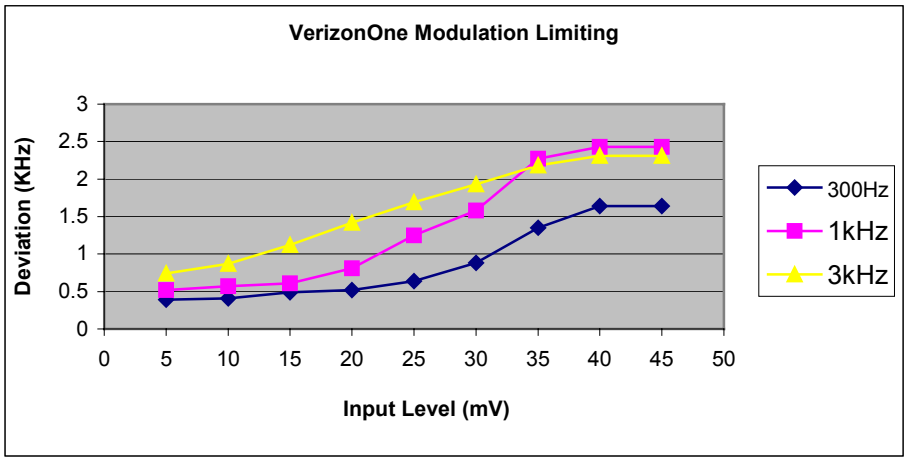

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .16dB
1.592MHz
AXESSTEL
CDMA
W2
H.C
ΔMKR
1.592 MHz
.16 dB
CENTER 848.190MHz
SPAN 5.000MHz
RBW 100kHz
VBW 100kHz
*SWP 50.0ms

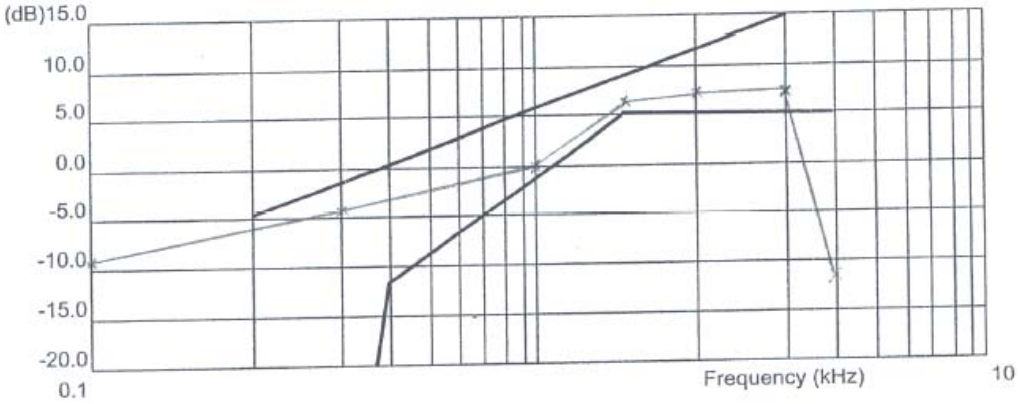

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .67dB
1.608MHz
AXESSTEL
PCS CDMA
W2
L.C
ΔMKR
1.608 MHz
.67 dB
CENTER 1.851250GHz
SPAN 5.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.33dB
1.625MHz
AXESSTEL
PCS CDMA
W2
M.C
ΔMKR
1.625 MHz
-.33 dB
CENTER 1.880000GHz
SPAN 5.000MHz
*RBW 100KHz
VBW 100KHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR 0dB
1.617MHz
AXESSTEL
PCS CDMA
W2
H.C
ΔMKR
1.617 MHz
0 dB
CENTER 1.908750GHz
SPAN 5.000MHz
*RBW 100KHz
VBW 100KHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.33dB
6.17kHz
AXESSTEL
AMPS
W2
ΔMKR
6.17 kHz
-.33 dB
CENTER 836.40000MHz
SPAN 50.00kHz
RBW 300Hz
VBW 300Hz
SWP 1.40sec


VerizonOne Modulation Limiting
Deviation (KHz)
3
2.5
2
1.5
1
0.5
0
0
5
10
15
20
25
30
35
40
45
50
Input Level (mV)
300Hz
1kHz
3kHz


(dB)15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
0.1
Frequency (kHz)
10

7 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 Test Procedure

Requirements: CFR 47, § 22.917, § 2.1051, § 2.1057, § 24.238 (a)

(e) Out of Band Emissions.

The means power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log P dB.

(f) Mobile Emissions in Base Frequency Range.

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed –80 dBm at the transmit antenna connector.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

7.2 Test Procedure

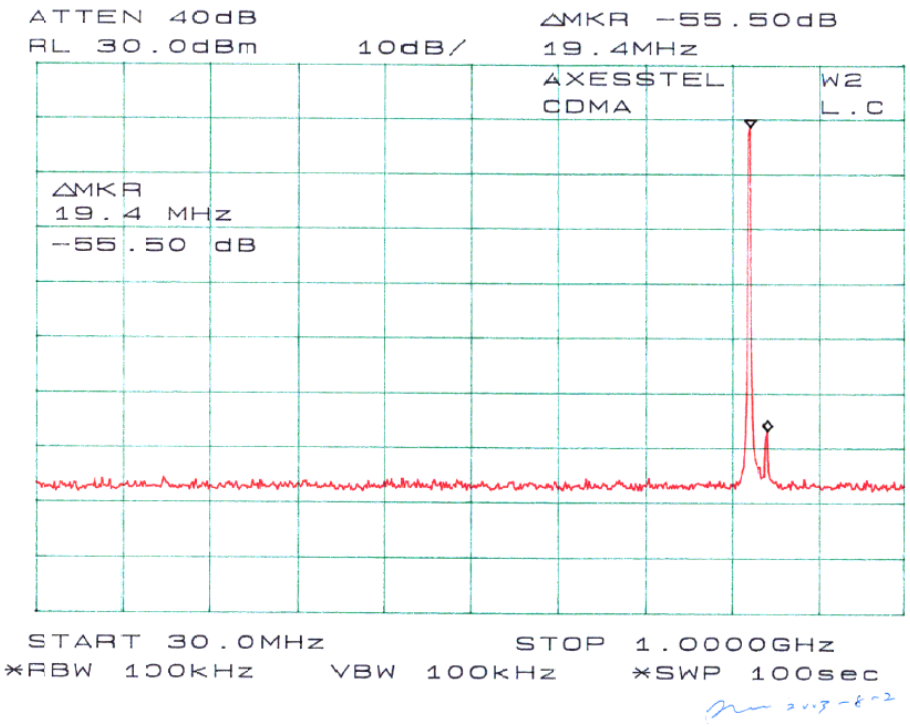
The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

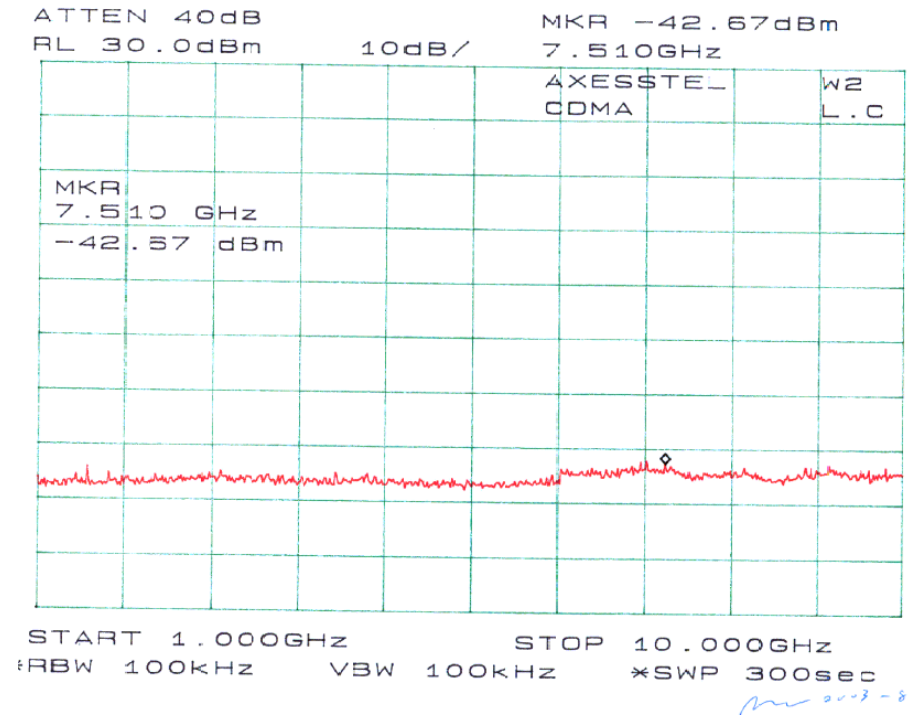
7.3 Test Equipment

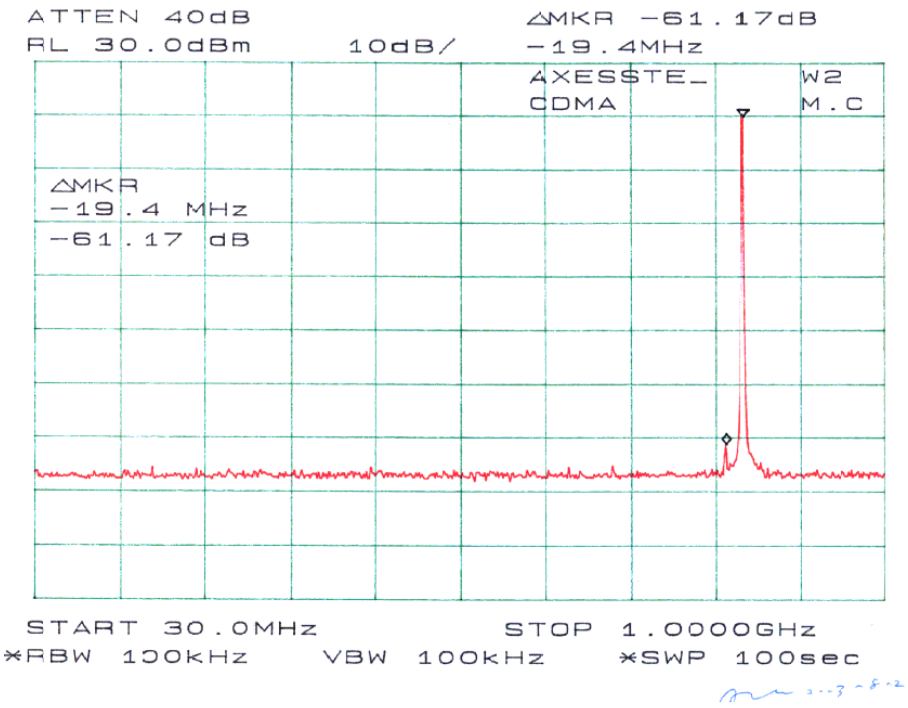
HP 8566B Spectrum Analyzer
HP 7470A Plotter
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

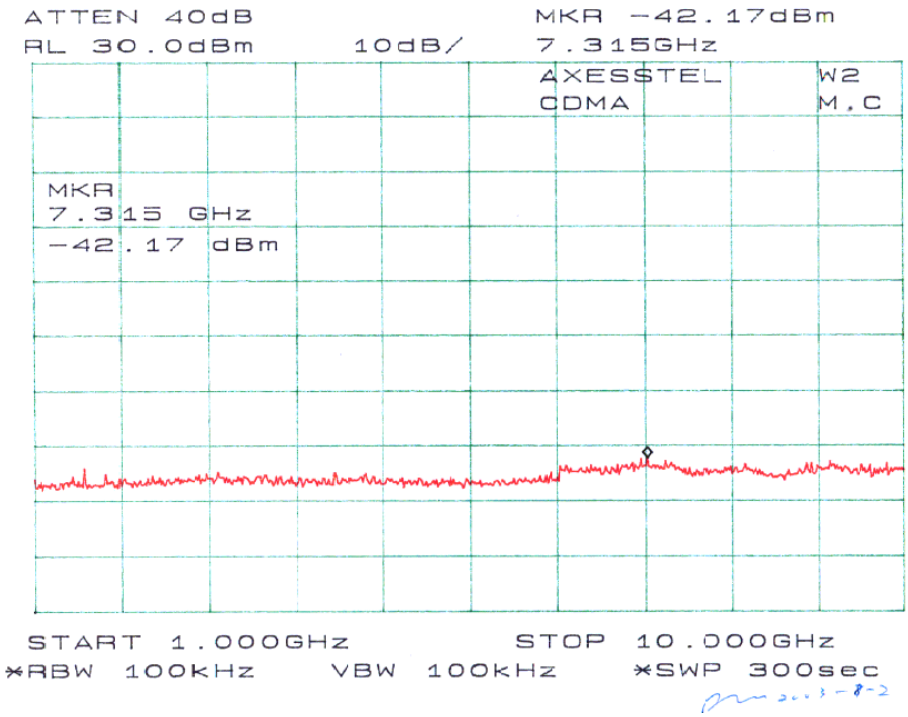
7.4 Test Results

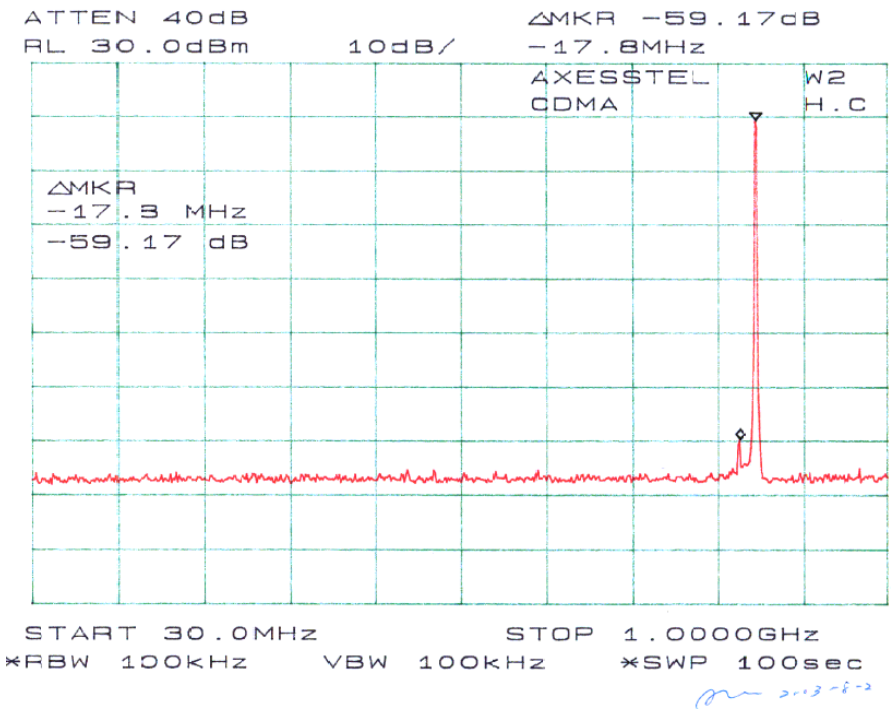
Please refer to the hereinafter plots.

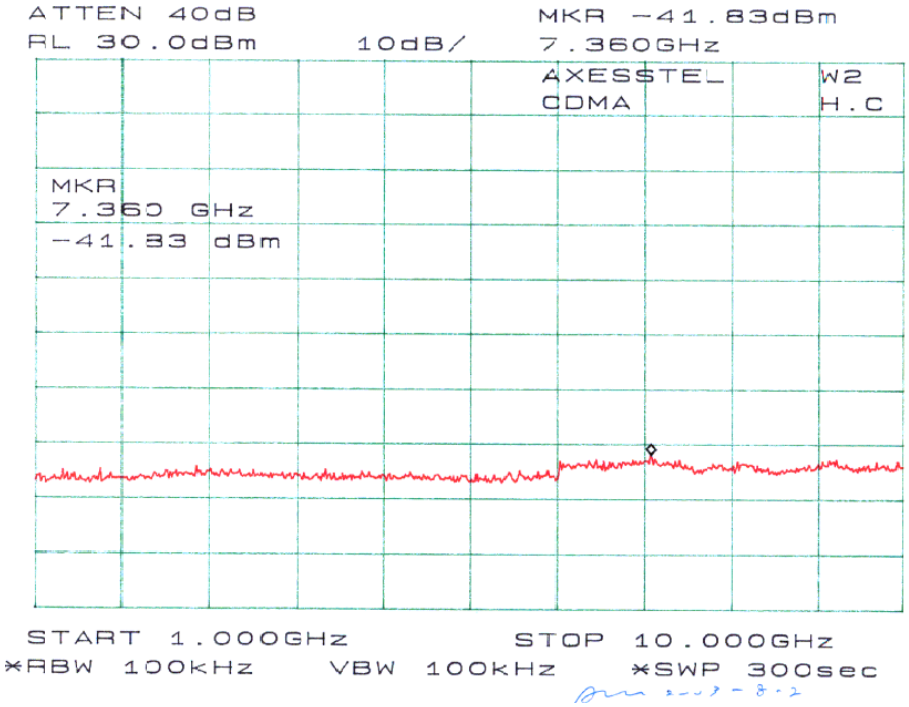

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -55.50dB
19.4MHz
AXESSTEL
CDMA
W2
L.C
ΔMKR
19.4 MHz
-55.50 dB
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

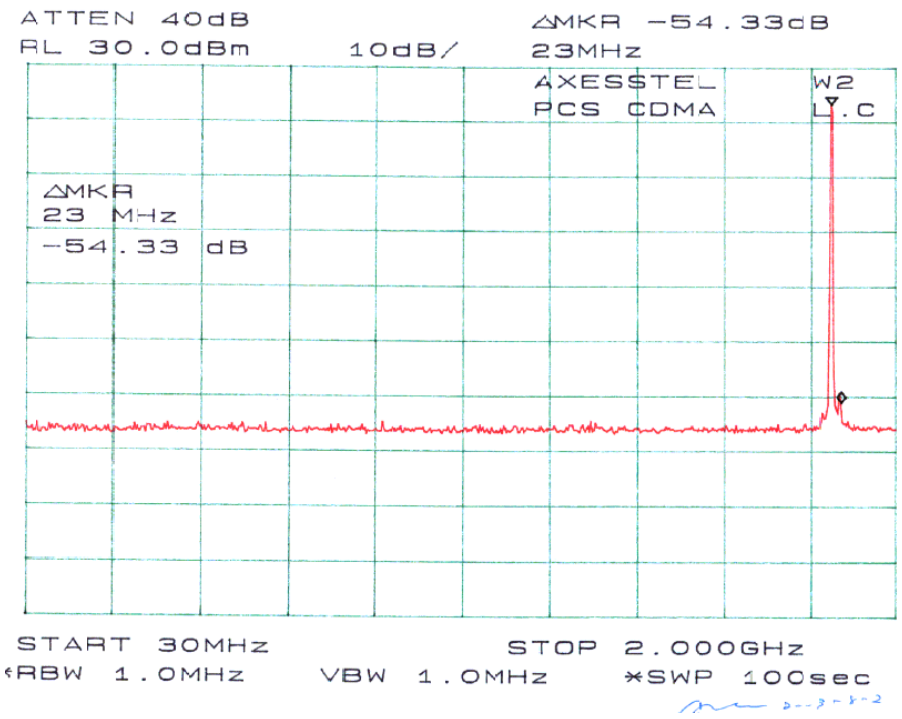

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -42.67dBm
7.510GHz
AXESSTEL
CDMA
W2
L.C
MKR
7.510 GHz
-42.57 dBm
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 300sec

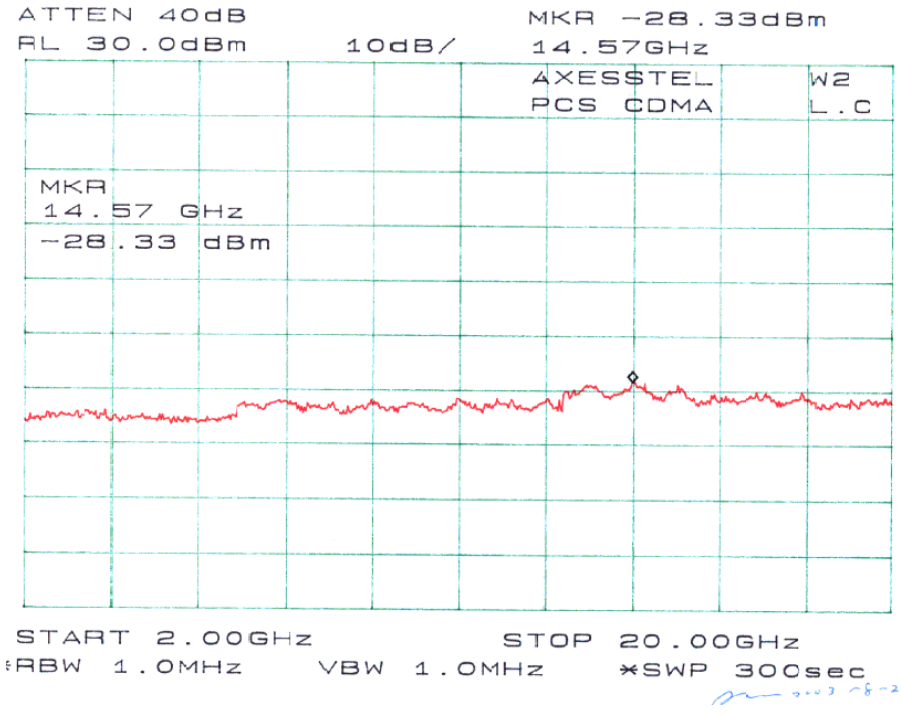

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -61.17dB
-19.4MHz
AXESSTE_
CDMA
W2
M.C
ΔMKR
-19.4 MHz
-61.17 dB
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

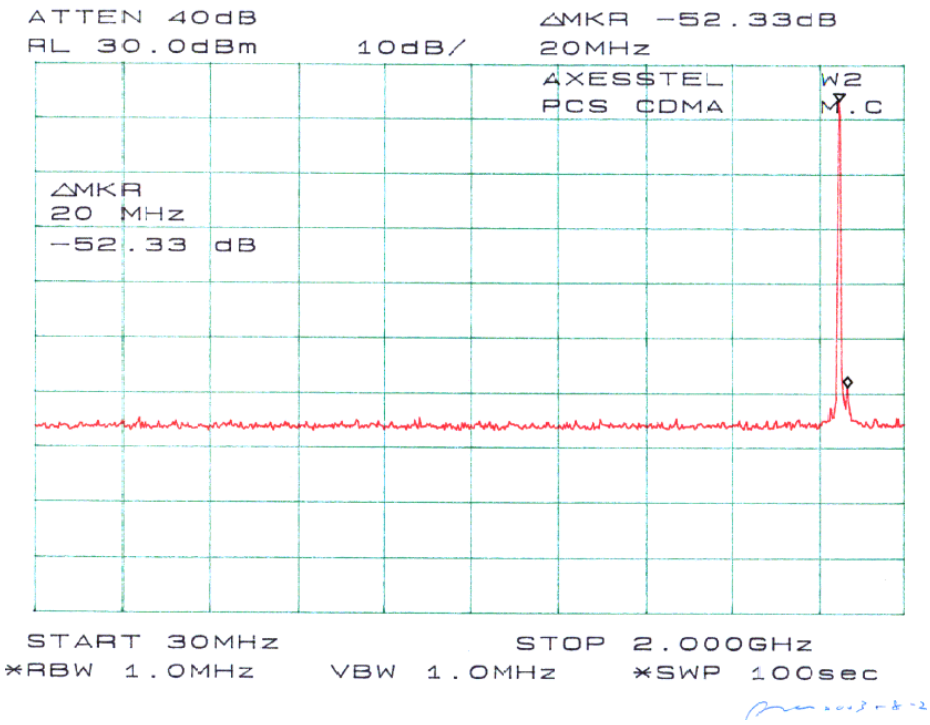

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -42.17dBm
7.315GHz
AXESSTEL
CDMA
W2
M.C
MKR
7.315 GHz
-42.17 dBm
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 300sec

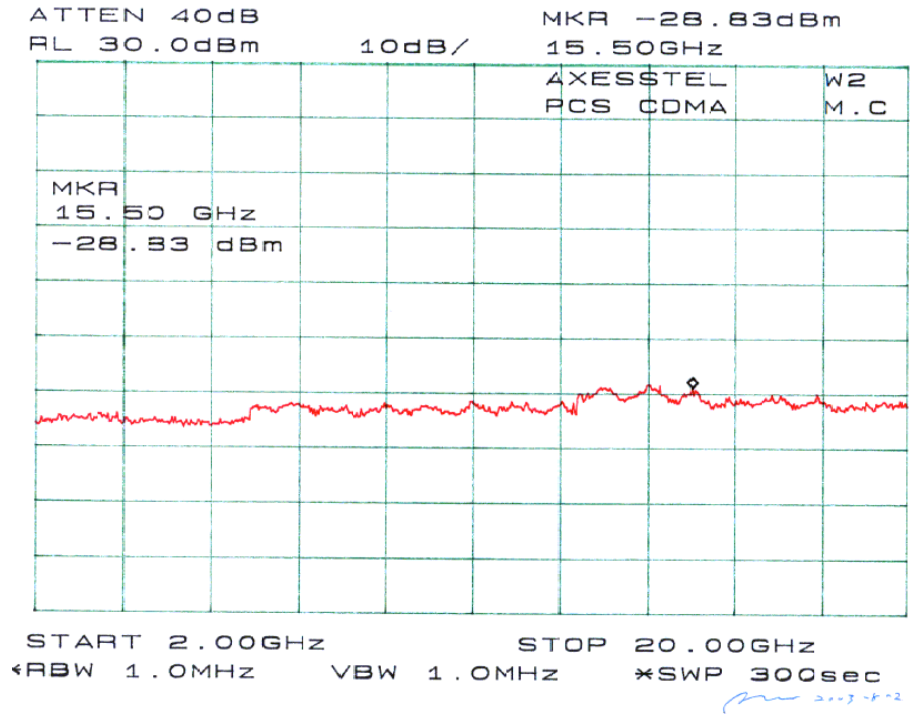

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -59.17dB
-17.8MHz
AXESSTEL
CDMA
W2
H.C
ΔMKR
-17.8 MHz
-59.17 dB
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

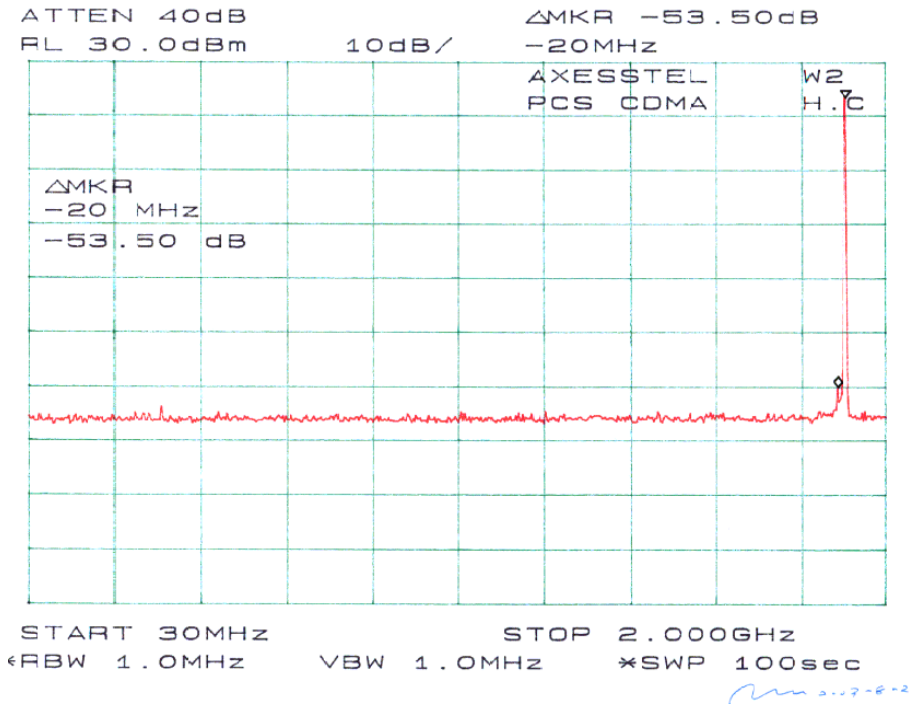

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -41.83dBm
7.360GHz
AXESSTEL
CDMA
W2
H.C
MKR
7.360 GHz
-41.83 dBm
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 300sec

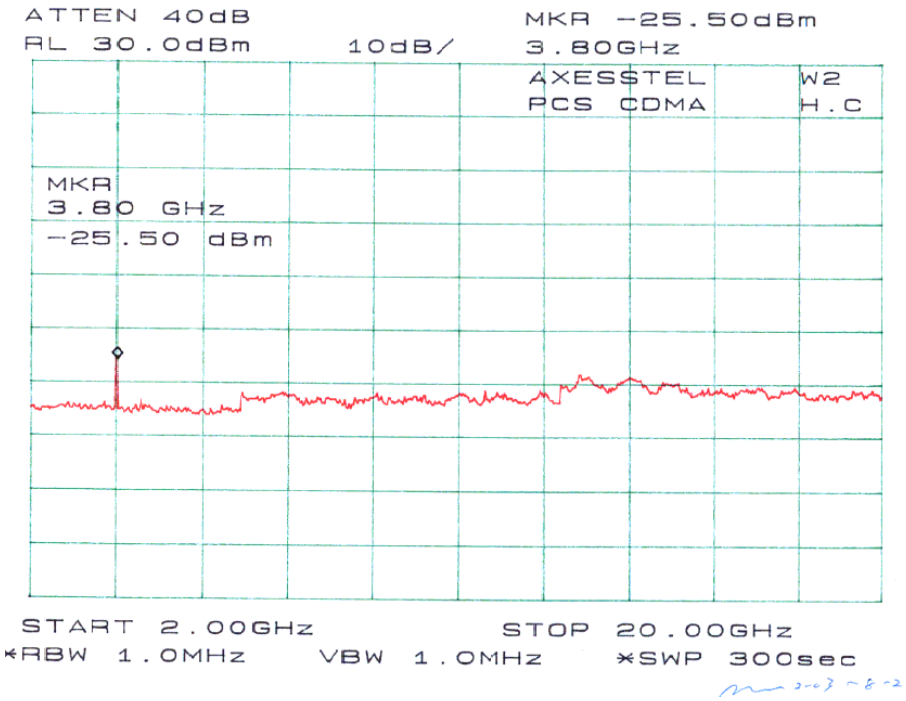

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -54.33dB
23MHz
AXESSTEL
PCS CDMA
W2
L.C
ΔMKR
23 MHz
-54.33 dB
START 30MHz
STOP 2.000GHz
#RBW 1.0MHz
VBW 1.0MHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -28.33dBm
14.57GHz
AXESSTEL
PCS CDMA
W2
L.C
MKR
14.57 GHz
-28.33 dBm
START 2.00GHz
STOP 20.00GHz
#RBW 1.0MHz
VBW 1.0MHz
*SWP 300sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -52.33dB
20MHz
AXESSTEL
PCS CDMA
W2
M.C
ΔMKR
20 MHz
-52.33 dB
START 30MHz
STOP 2.000GHz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -28.83dBm
15.50GHz
AXESSTEL
PCS CDMA
W2
M.C
MKR
15.50 GHz
-28.83 dBm
START 2.00GHz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 300sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -53.50dB
-20MHz
AXESSTEL
PCS CDMA
W2
H.C
ΔMKR
-20 MHz
-53.50 dB
START 30MHz
STOP 2.000GHz
#RBW 1.0MHz
VBW 1.0MHz
*SWP 100sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -25.50dBm
3.80GHz
AXESSTEL
PCS CDMA
W2
H.C
MKR
3.80 GHz
-25.50 dBm
START 2.00GHz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 300sec

8 - RADIATED SPURIOUS EMISSION

8.1 Test Procedure

Requirements: CFR 47, § 2.1053, § 22.917 and § 24.238 (a).

8.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

8.3 Test Equipment

CDI B100/200/300 Biconical Antennas
EMCO Bi-logcon Antenna
EMCO 3115 Horn Antenna
HP 8566B Spectrum Analyzer
Preamplifiers
HP8640 Generator
Non-radiating Load

8.4 Test Result

PMS: Low Frequency: -20.5dB at 1649.46MHz
Middle Frequency: -21.6dB at 1672.8MHz
High Frequency: -20.5dB at 1696.38MHz

PCS: Low Frequency: -28.3dB at 3702.5MHz
Middle Frequency: -28.5dB at 3760MHz
High Frequency: -30.2dB at 3817.5MHz

Compliance Statement

According to FCC Part 15, at 3-meter distance the emission from an intentional radiator shall not exceed the field strength level 40dBuV/m within 30-88MHz, 43.5dBuV/m within 88-216MHz, 46dBuV/m within 226-960MHz, 54dBuV/m above 960MHz. The level of any unwanted emissions shall not exceed the level of the fundamental frequency.

The levels of unwanted emission of this device were below the above limits. This device was compliant with the FCC Part 15.

Test Data for PMS-CDMA

EUT					Generator						Standard	
Indicated		Table	Test Antenna		Substitution			Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Polar H/V	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin DBm
LOW CHANNEL AT 824.73 MHZ												
824.73	118.7	0	1.5	V	824.73	21.9	V	0	0.1	21.8		
824.73	112.1	30	1.2	H	824.73	20.5	H	0	0.1	20.4		
1649.46	67.5	160	1.5	H	1649.46	-39.8	H	6.8	0.5	-33.5	-13	-20.5
1649.46	64.2	90	1.5	V	1649.46	-42.5	V	6.8	0.5	-36.2	-13	-23.2
2474.19	37.6	270	1.5	H	2474.19	-71.4	H	7.6	0.7	-64.5	-13	-51.5
2474.19	34.2	210	1.2	V	2474.19	-73.8	V	7.6	0.7	-66.9	-13	-53.9
MIDDLE CHANNEL AT 836.4 MHZ												
836.4	119.3	15	1.2	V	836.4	22.9	V	0	0.1	22.8		
836.4	113.2	30	1.2	H	836.4	21.3	H	0	0.1	21.2		
1672.8	65.9	130	1.5	H	1672.8	-40.9	H	6.8	0.5	-34.6	-13	-21.6
1672.8	63.6	110	1.5	V	1672.8	-43.7	V	6.8	0.5	-37.4	-13	-24.4
2507.4	38.2	45	1.5	H	2507.4	-69.5	H	7.6	0.7	-62.6	-13	-49.6
2507.4	34.5	0	1.2	V	2507.4	-72.7	V	7.6	0.7	-65.8	-13	-52.8
HIGH CHANNEL AT 848.19 MHZ												
848.19	119.2	45	1.5	V	848.19	22.7	V	0	0.1	22.6		
848.19	112.8	90	1.8	H	848.19	20.9	H	0	0.1	20.8		
1696.38	67.6	30	1.5	H	1696.38	-39.8	H	6.8	0.5	-33.5	-13	-20.5
1696.38	64.3	0	1.2	V	1696.38	-42.1	V	6.8	0.5	-35.8	-13	-22.8
2544.57	37.1	180	1	H	2544.57	-70.4	H	7.6	0.7	-63.5	-13	-50.5
2544.57	34.4	160	1.5	V	2544.57	-73.1	V	7.6	0.7	-66.2	-13	-53.2

Test Data for PCS-CDMA

EUT					Generator						Standard	
Indicated		Table	Test Antenna		Substitution			Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Polar H/V	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin DBm
LOW CHANNEL AT 1852.50 MHZ												
1851.25	122.9	270	1.5	V	1851.25	15.2	V	6.7	0.5	21.4		
1851.25	123.1	230	1.5	H	1851.25	16.5	H	6.7	0.5	22.7		
3702.5	49.3	110	1.5	H	3702.5	-49.3	H	8.8	0.8	-41.3	-13	-28.3
3702.5	48.8	90	1.5	V	3702.5	-50.7	V	8.8	0.8	-42.7	-13	-29.7
5553.75	43.9	0	1.2	V	5553.75	-73.8	V	9.1	1.1	-65.8	-13	-52.8
5553.75	41.7	45	1.2	H	5553.75	-75.2	H	9.1	1.1	-67.2	-13	-54.2
MIDDLE CHANNEL AT 1880.00 MHZ												
1880	122.1	15	1.8	V	1880	15.4	V	6.7	0.5	21.6		
1880	123.2	0	1.5	H	1880	16.2	H	6.7	0.5	22.4		
3760	49.1	270	1.2	H	3760	-49.5	H	8.8	0.8	-41.5	-13	-28.5
3760	48.6	230	1.5	V	3760	-50.9	V	8.8	0.8	-42.9	-13	-29.9
5640	43.7	160	1.2	V	5640	-74.1	V	9.1	1.1	-66.1	-13	-53.1
5640	42.1	15	1.2	H	5640	-74.6	H	9.1	1.1	-66.6	-13	-53.6
HIGH CHANNEL AT 1907.5 MHZ												
1908.75	121.2	150	1.5	V	1908.75	14.7	V	6.7	0.5	20.9		
1908.75	121.7	190	1.5	H	1908.75	15.1	H	6.7	0.5	21.3		
3817.5	47.6	30	1.5	H	3817.5	-51.2	H	8.8	0.8	-43.2	-13	-30.2
3817.5	47.3	0	1.2	V	3817.5	-51.7	V	8.8	0.8	-43.7	-13	-30.7
5726.25	42.5	270	1.5	V	5726.25	-74.9	V	9.1	1.1	-66.9	-13	-53.9
5726.25	41.1	290	1	H	5726.25	-75.6	H	9.1	1.1	-67.6	-13	-54.6

9 - FREQUENCY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) and § 24.235

9.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

9.3 Test Equipment

Temperature Chamber -50^0 to $+100^0$C
Hewlett Packard 5383A Frequency Counter
Goldstar DC Power Supply, GR303

9.4 Test Results

Frequency Stability Versus Temperature

Reference Frequency: 835.8904 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MCF (MHz)	PPM Error
50	9	835.89053	0.16
40	9	835.59052	0.14
30	9	835.89047	0.08
20	9	835.8904	0
10	9	835.8904	0
0	9	835.89038	-0.02
-10	9	835.89038	-0.02
-20	9	835.89037	-0.03
-30	9	835.89037	-0.03

Frequency Stability Versus Input Voltage

Power Supplied (Vdc)	Reference Frequency: 835.8904MHz, Limit: 2.5 ppm			
	Frequency Measure with Time Elapsed			
	5 Minutes		10 Minutes	
	MHz	PPM	MHz	PPM
3.7	835.8904	0	836.001	0
3.7	835.89037	-0.04	835.89037	-0.04

Conclusion: The EUT complied with the applicable Frequency Stability Limits.

10 – CONDUCTED EMISSIONS

Not Applicable.

11 – BAND EDGE TEST

11.1 Applicable Standards

According to FCC §2.1049 and §24.238, when measuring the emission limits, carrier frequency shall be adjusted as close to the frequency block edges, both upper and lower.

11.2 Test Procedure

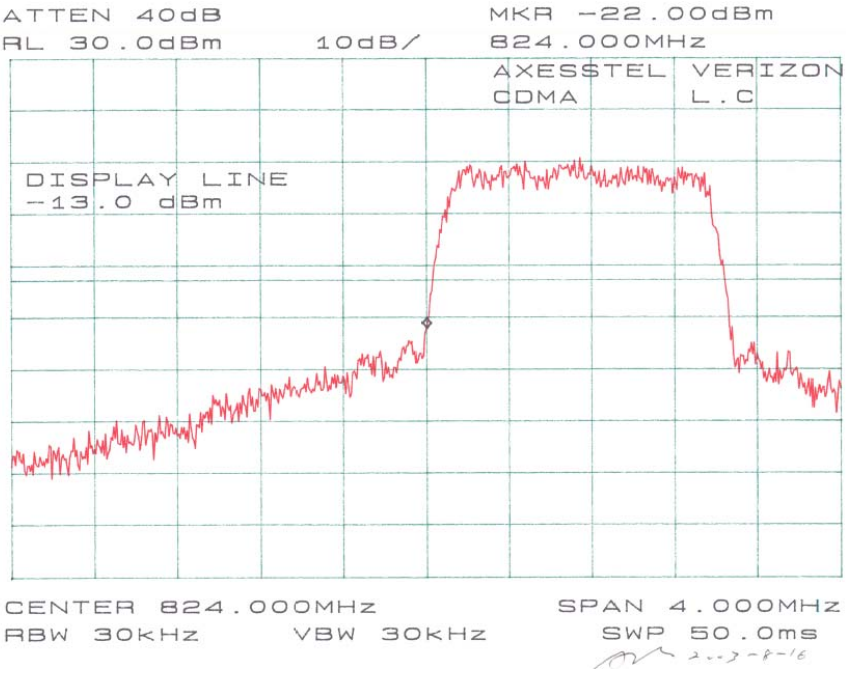
The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Adjust the carrier frequency as close to the frequency block edges both upper and lower. Sufficient scans were taken to show any out of band-edge emission.

11.3 Test Equipment

Agilent 8565EC Spectrum Analyzer
HP 7470A Plotter
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator
Hewlett Packard 8449 Amplifier
A.H. Systems, Inc SAS-200/571 Horn Antenna

11.4 Plots of Out-of-Band-Edge Emissions at Antenna Terminal

Please refer to plots hereinafter.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RL 30.0dBm
10dB/
MKR -22.00dBm
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CDMA L.C
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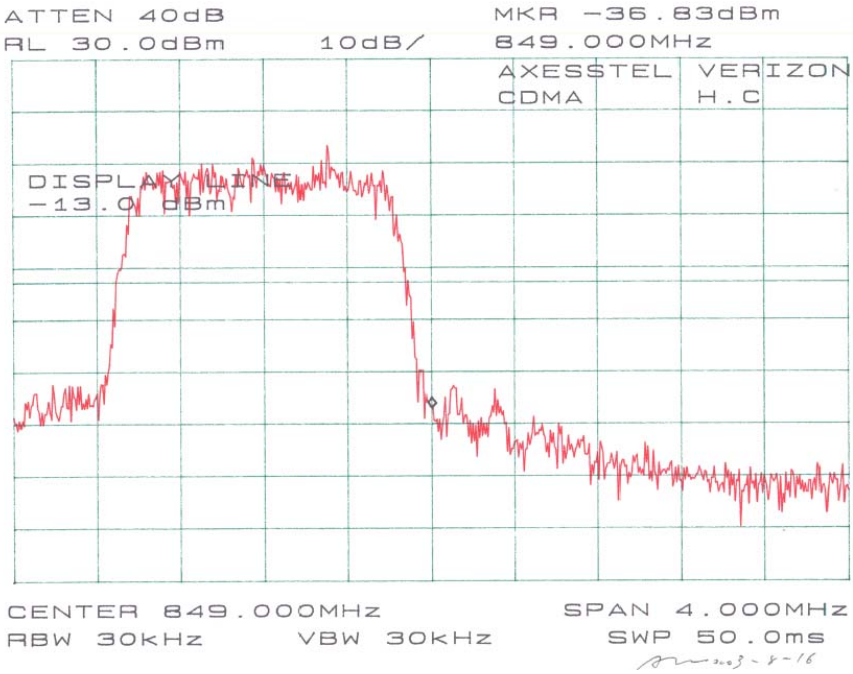
CENTER 824.000MHz
SPAN 4.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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CDMA H.C
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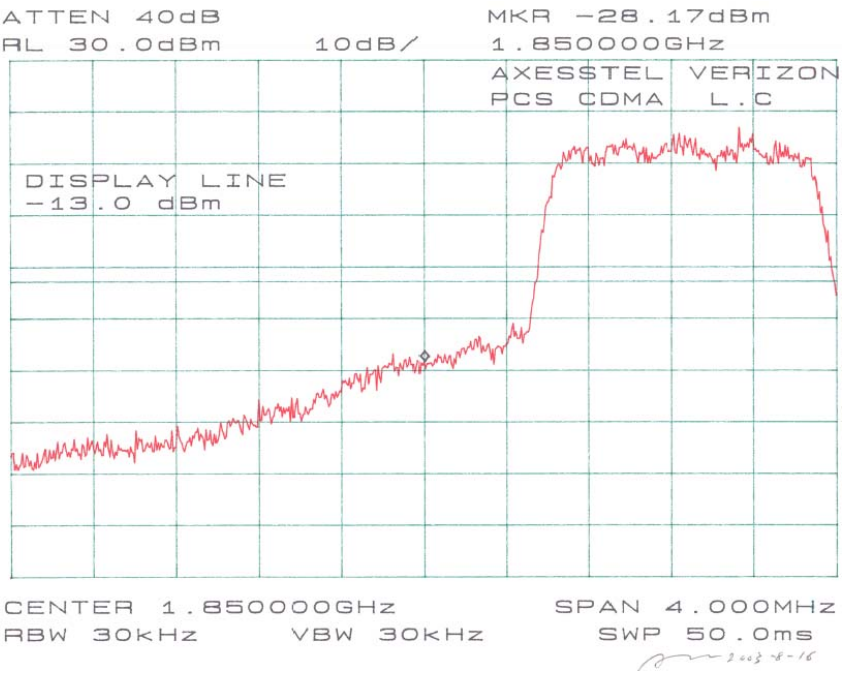
CENTER 849.000MHz
SPAN 4.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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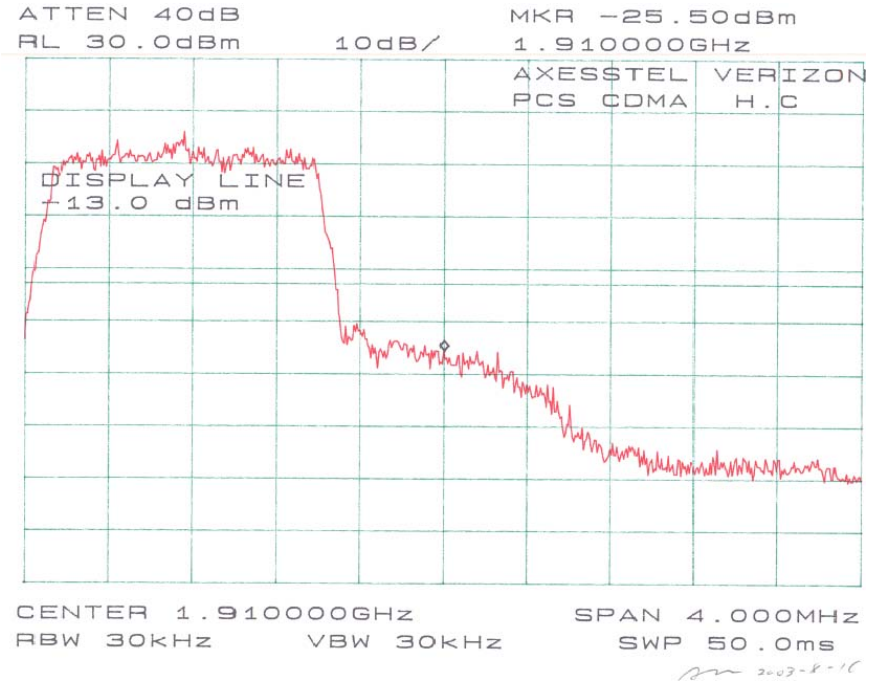
RL 30.0dBm
10dB/
MKR -28.17dBm
1.850000GHz
AXESSTEL VERIZON
PCS CDMA L.C
DISPLAY LINE
-13.0 dBm
CENTER 1.850000GHz
SPAN 4.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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RL 30.0dBm
10dB/
MKR -25.50dBm
1.910000GHz
AXESSTEL VERIZON
PCS CDMA H.C
DISPLAY LINE
-13.0 dBm
CENTER 1.910000GHz
SPAN 4.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms