



FCC CFR47 CERTIFICATION

PART 24E

TEST REPORT

FOR

1900MHz CDMA CELLULAR PHONE HANDSET

MODEL: VP-5U

FCC ID: GKRVP-5U

REPORT NUMBER: 03I2380-1

ISSUE DATE: DECEMBER 08, 2003

Prepared for
**COMPAL ELECTRONICS, INC.
7F, NO. 500, JUIKUANG ROAD
NEIHU, TAIPEI TAIWAN ROC 114**

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: COMPAL ELECTRONICS, INC.
7F, NO. 500, JUIKUANG ROAD
NEIHU, TAIPEI TAIWAN ROC 114

EUT DESCRIPTION: 1900MHz CDMA CELLULAR PHONE HANDSET

MODEM NAME: VP-5U

DATE TESTED: DECEMBER 08, 2003

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	LICENSED TX MODULE IN MOBILE APPLICATION
MEASUREMENT PROCEDURE	ANSI 63.4 / 2001, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 24 subpart E

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 2 Subpart E-Cellular Radiotelephone Service. The equipment in the 4configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Tested By:



VIEN TRAN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Released For CCS By:



THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The 1900MHz CDMA Cellular Phone has an output power 29.7dBm / 933.25mW (CDMA, EIRP). It has a fixed type antenna, and 1.7dBi gain which is designed for the Cellular band transmitting of frequency range 1851.25-1908.75MHz.

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

4. TEST FACILITY

The test sites and measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2))

6. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

7. TEST SETUP, PROCEDURE AND RESULT

7.1. SECTION 2.1046: RF POWER OUTPUT

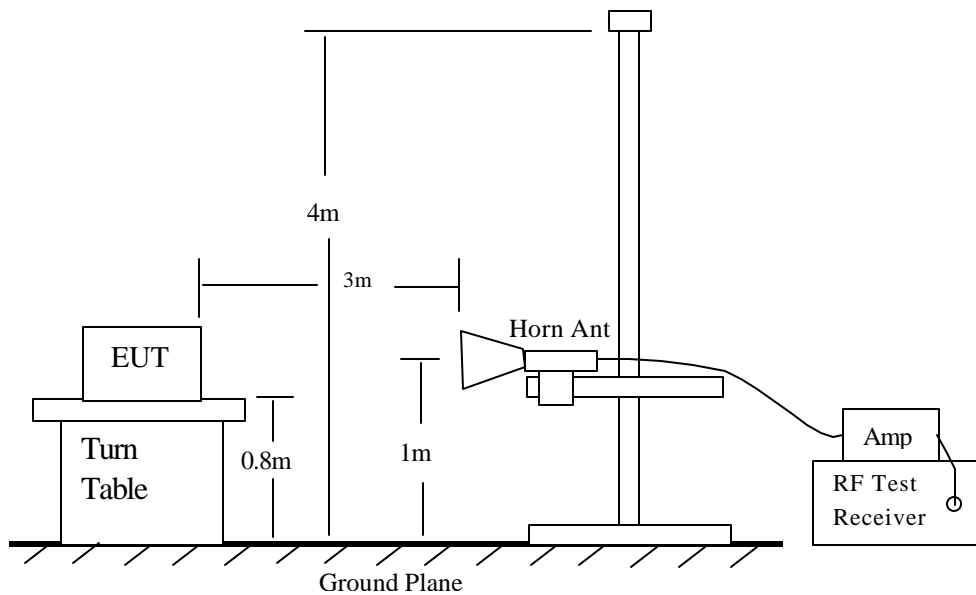
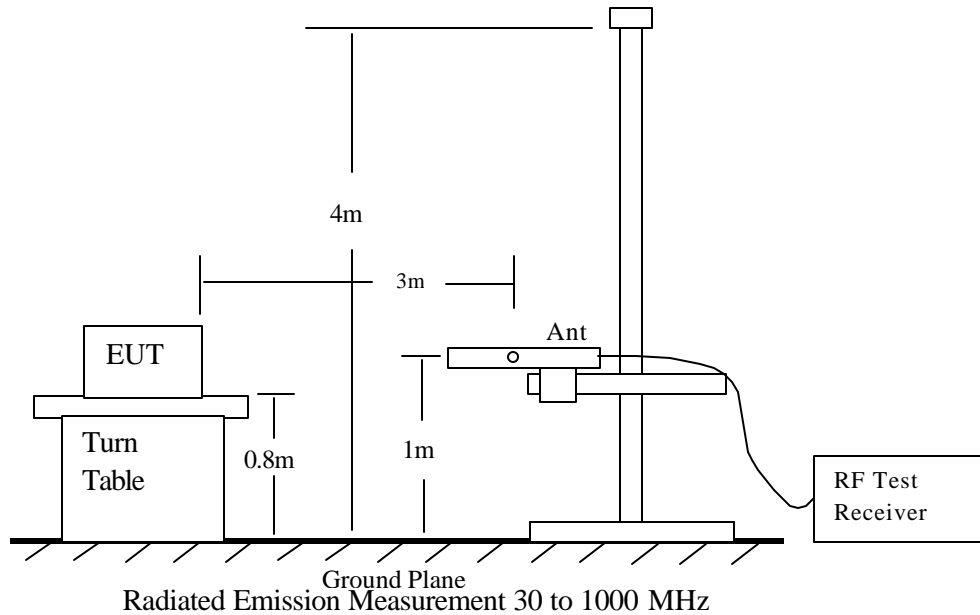
INSTRUMENTS LIST

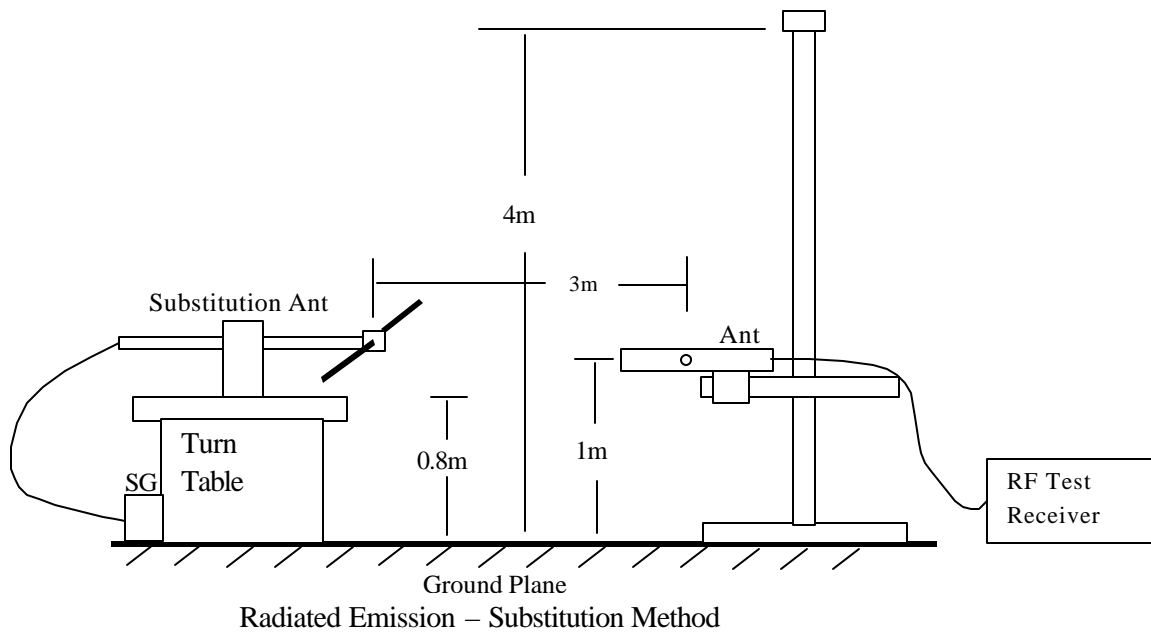
TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	US42070220	1/13/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	2/4/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/4/2004
Signal Generator, 10 MHz ~ 20 GHz	HP	83732B	US34490599	4/4/2004
Peak Power Meter	Agilent	E4416A	GB41291160	11/7/2004

MEASUREMENT PROCEDURE

- 1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
- 2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.
- 3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- 4). The transmitter shall be placed 0.80 meter above the ground plane, the X, Y, and Z positions shall be tested and the worst case reported. The transmitter shall be switched on with typical modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test
- 5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 8). The maximum signal level detected by the measuring receiver shall be noted.

- 9). The transmitter shall be replaced by a horn antenna (substitution antenna).
- 10). The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- 11). The substitution antenna shall be connected to a calibrated signal generator.
- 12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
- 17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.





TEST RESULT:

CDMA _ 1900MHz

	CONDUCTED AVERAGE (dBm)	EIRP PEAK (dBm)
LOW_CH 25	24.25	28.10
MID_CH 600	24.14	29.70
HI _CH 1175	24.28	29.10

ANTENNA GAIN = 1.7dBi

CDMA Output Power (EIRP):

12/05/03
High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
Project #: 03I2380-1
Company: COMPAL ELECTRONICS, INC.
EUT Descrip.: 1900MHz CELLULAR PHONE HANDSET WITH FIXED ANTENNA
EUT M/N: VP-5U
Test Target: FCC PART 24 _FUNDAMENTAL SUBSTITUTION
Mode Oper: THE ANTENNA OF EUT AT X POSIONTION_ Tx AT L/M/H CHANNELS

Test Equipment:

EMCO Horn 1-18GHz

Pre-amplifier 1-26GHz

Spectrum Analyzer

Horn > 18GHz

Limit

T73: S/N: 6717 @ 3r

Agilent E4446A Analyzer

EIRP

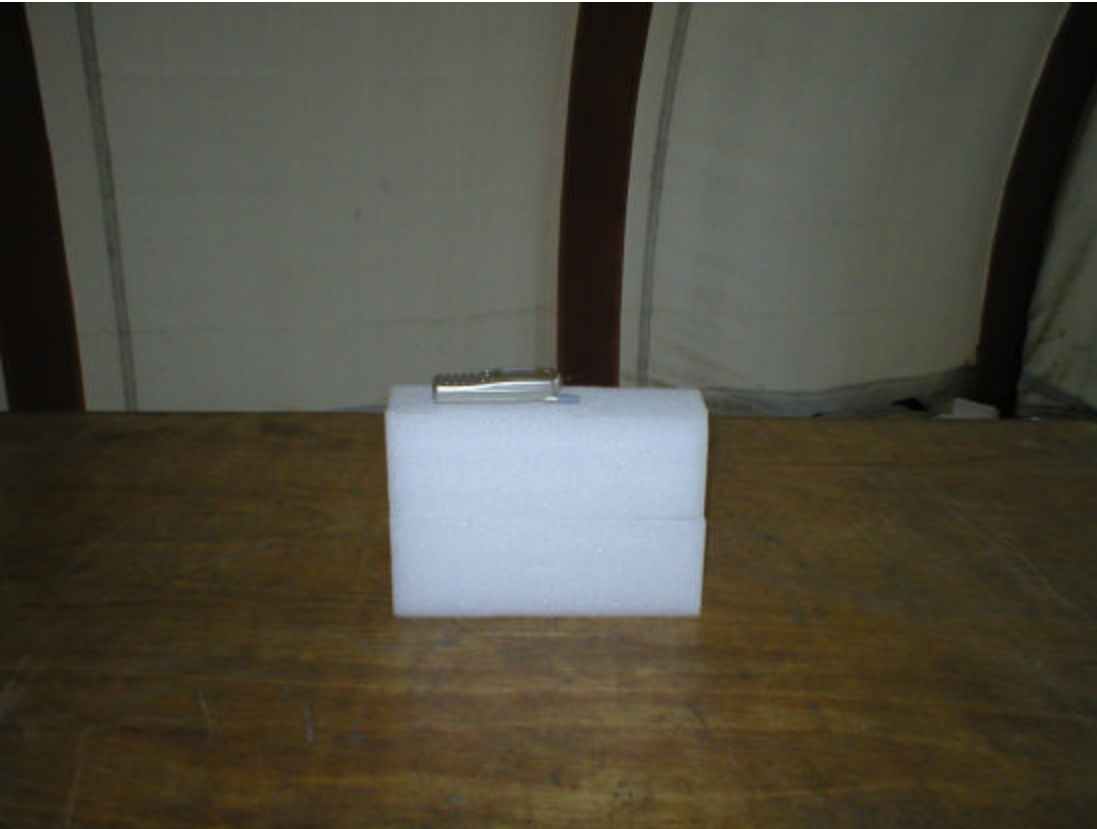
Hi Frequency Cables
☐ (2 ft)
☐ (2 ~ 3 ft)
☒ (4 ~ 6 ft)
☐ (12 ft)

Peak Measurements:
Fundamental:
RBW>99% or 26dB Emissions BW
VBW=RBW
Bandedge:
RBW=>1% Emissions BW
VBW=> 3*RBW
Spurious
RBW=1MHz
VBW=1MHz

f GHz	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
LOW CH									
1.851	85.7	15.8	0.4	7.8	5.7	23.2	33.0	-9.8	V.X POS.
1.851	95.7	20.7	0.4	7.8	5.7	28.1	33.0	-4.9	H.X POS.
MID CH									
1.880	85.8	15.2	0.4	7.9	5.7	22.6	33.0	-10.4	V.X POS.
1.880	97.7	22.3	0.4	7.9	5.7	29.7	33.0	-3.3	H.X POS.
HI CH									
1.909	89.0	18.6	0.4	7.9	5.8	26.1	33.0	-6.9	V.X POS.
1.909	97.6	21.6	0.4	7.9	5.8	29.1	33.0	-3.9	H.X POS.

Note: RBW=VBW=3MHz

EMISSION SETUP

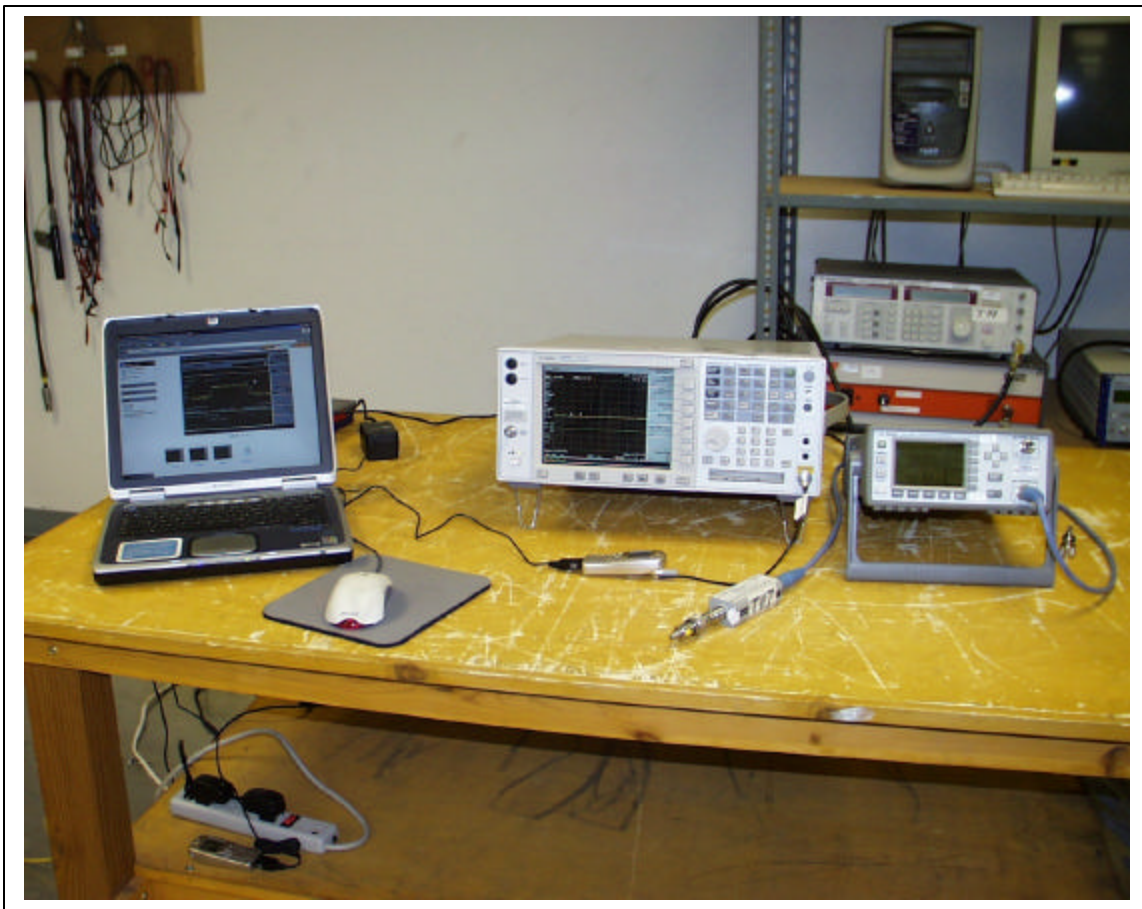
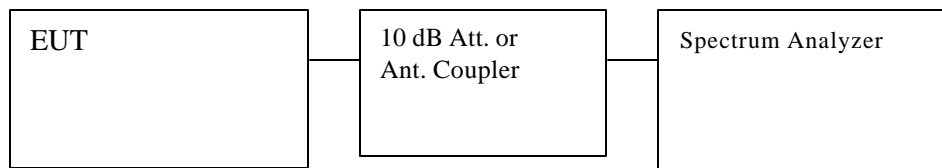


7.2. SECTION 2.1047: MODULATION CHARACTERISTICS

Not applicable, the EUT is single mode CDMA only.

7.3. SECTION 2.1049: OCCUPIED BANDWIDTH

SETUP CONFIGURATION



INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	1/13/04
Attenuator	MINI CIRCUITS	MCL BW-S10W2	N/A

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% of the Emission bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

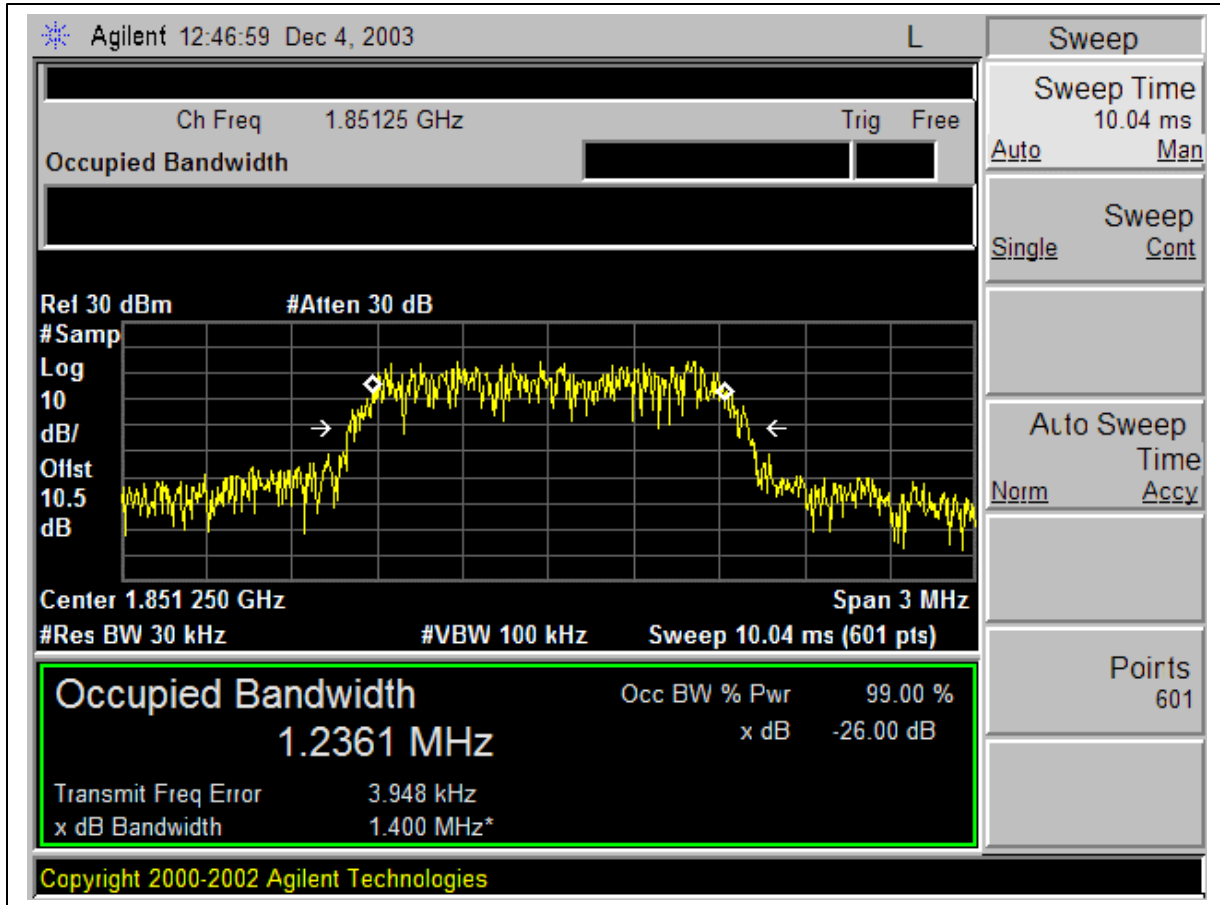
RESULTS

No non-compliance noted:

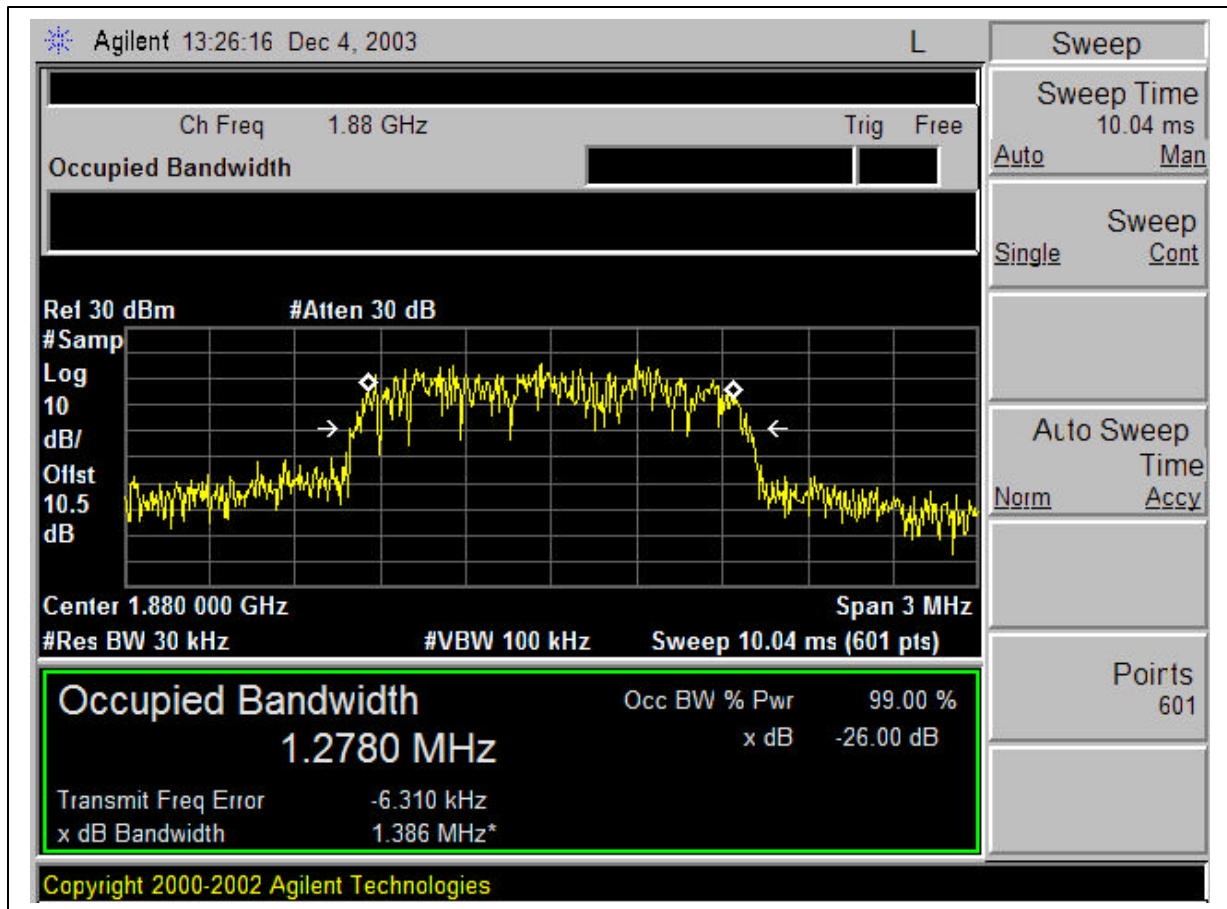
Channel	Frequency (MHz)	26dB BW (MHz)
Low _ CH 25	1851.25	1.400
Middle _ CH 600	1880.00	1.386
High _ CH 1175	1908.75	1.388

OCCUPIED BANDWIDTH

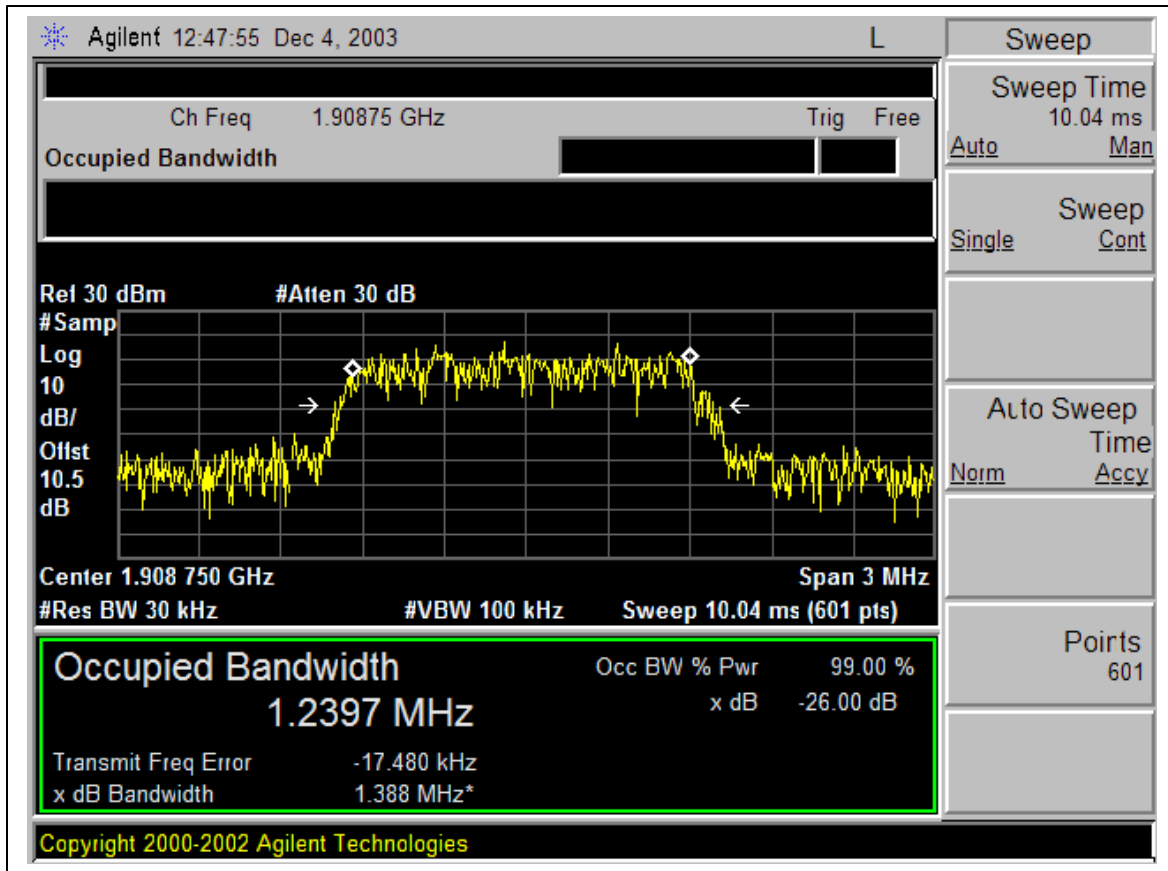
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

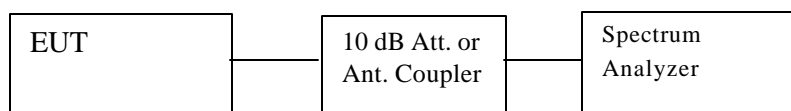


7.4. SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	1/13/04
Attenuator	MINI CIRCUITS	MCL BW-S10W2	N/A

TEST SETUP



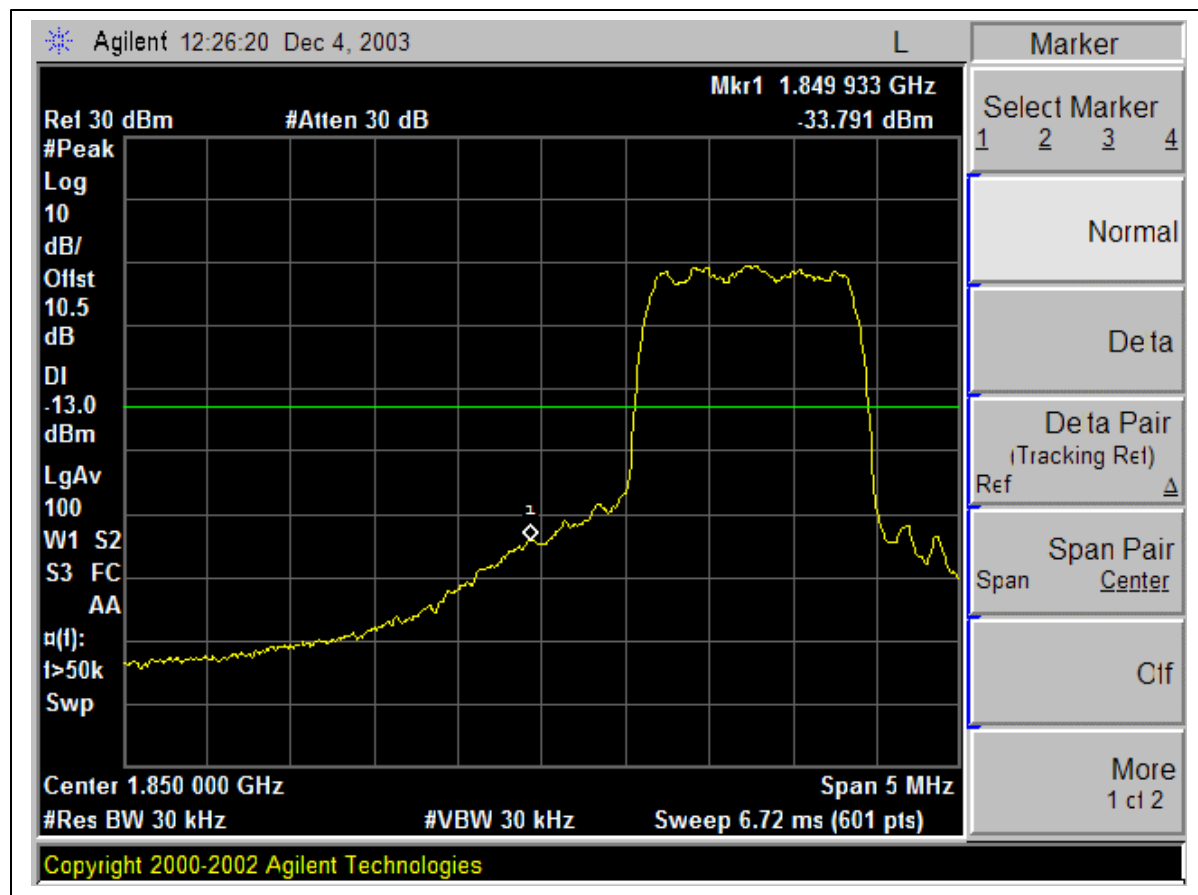
TEST PROCEDURE

- 1) EUT's RF output connector (made solely for the purpose of the test) is connected to the spectrum analyzer, and set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge. Set the RES BW to 1% of the emission bandwidth to show compliance with the -13dBm limit, in the 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.
- 2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 15 MHz to $10 \times f_o$ of the fundamental carrier for all frequency block. A display line was placed at -13dBm to show compliance for spurious, and harmonics.

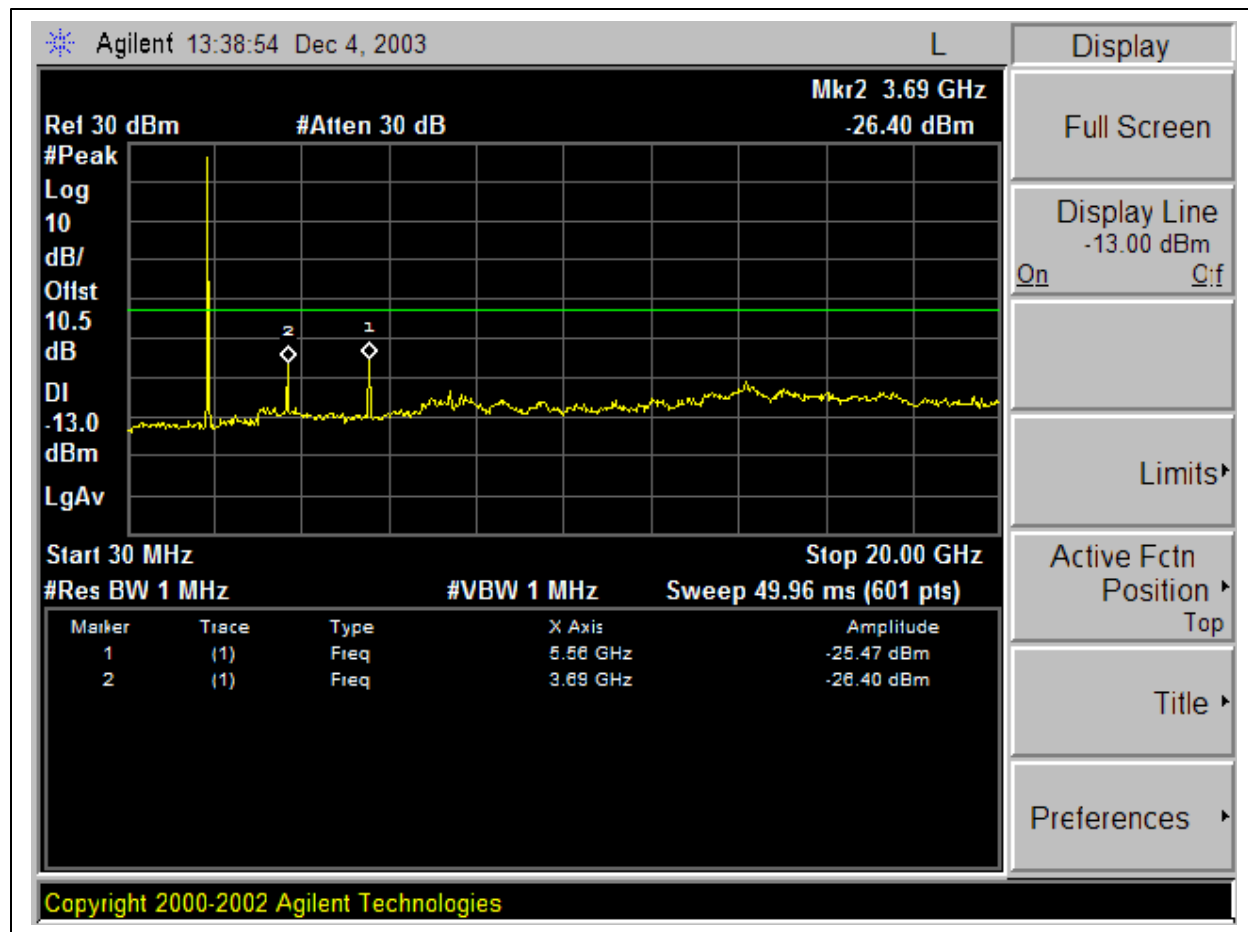
RESULT:

CDMA MODULATION – LOW / MID / HIGH BAND EDGE AND OUT OF BAND EMISSION

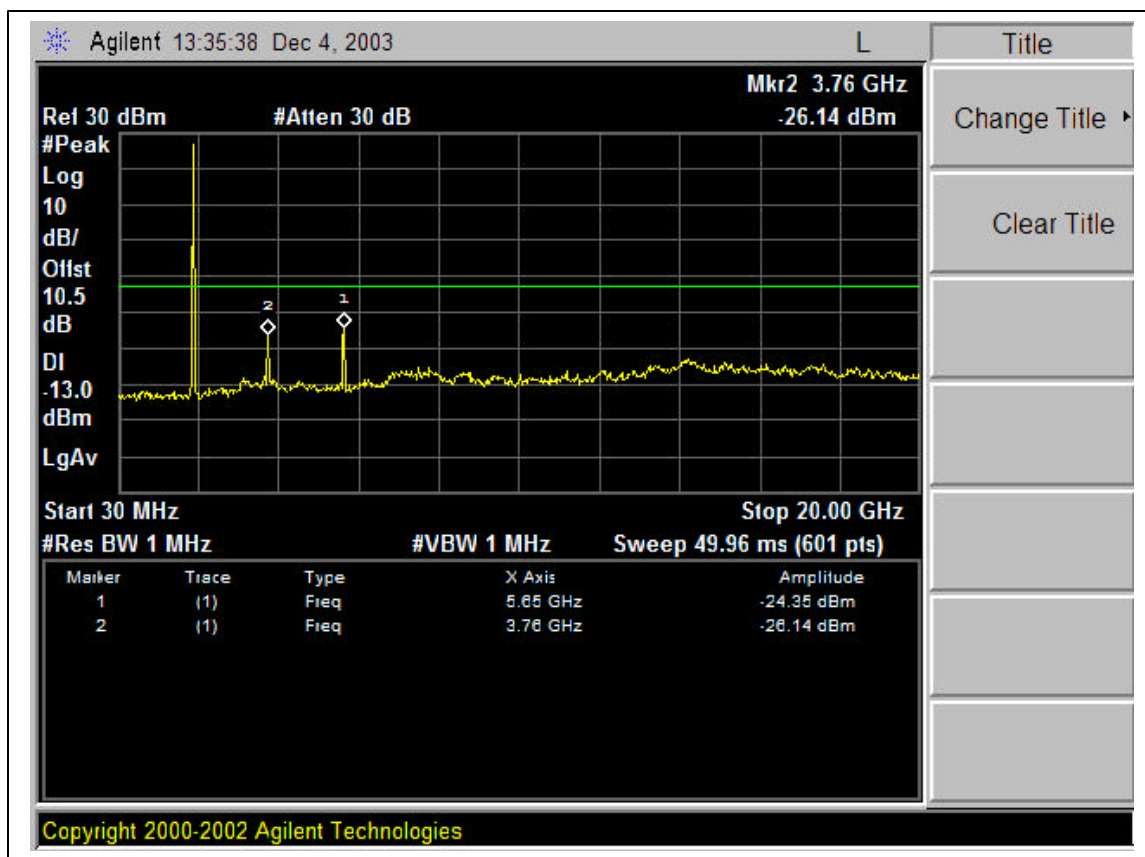
LOW CHANNEL BAND EDGE



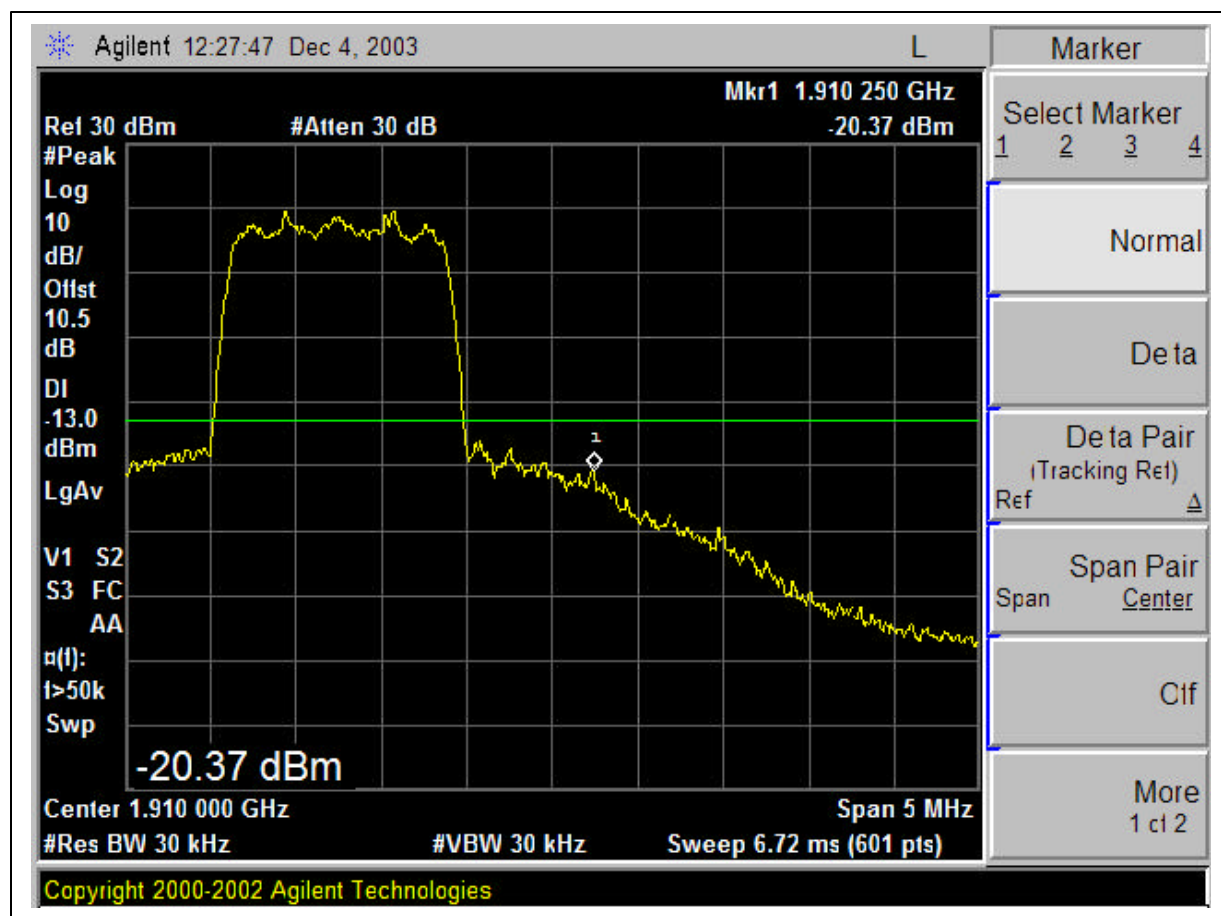
LOW CHANNEL OUT OF EMISSION



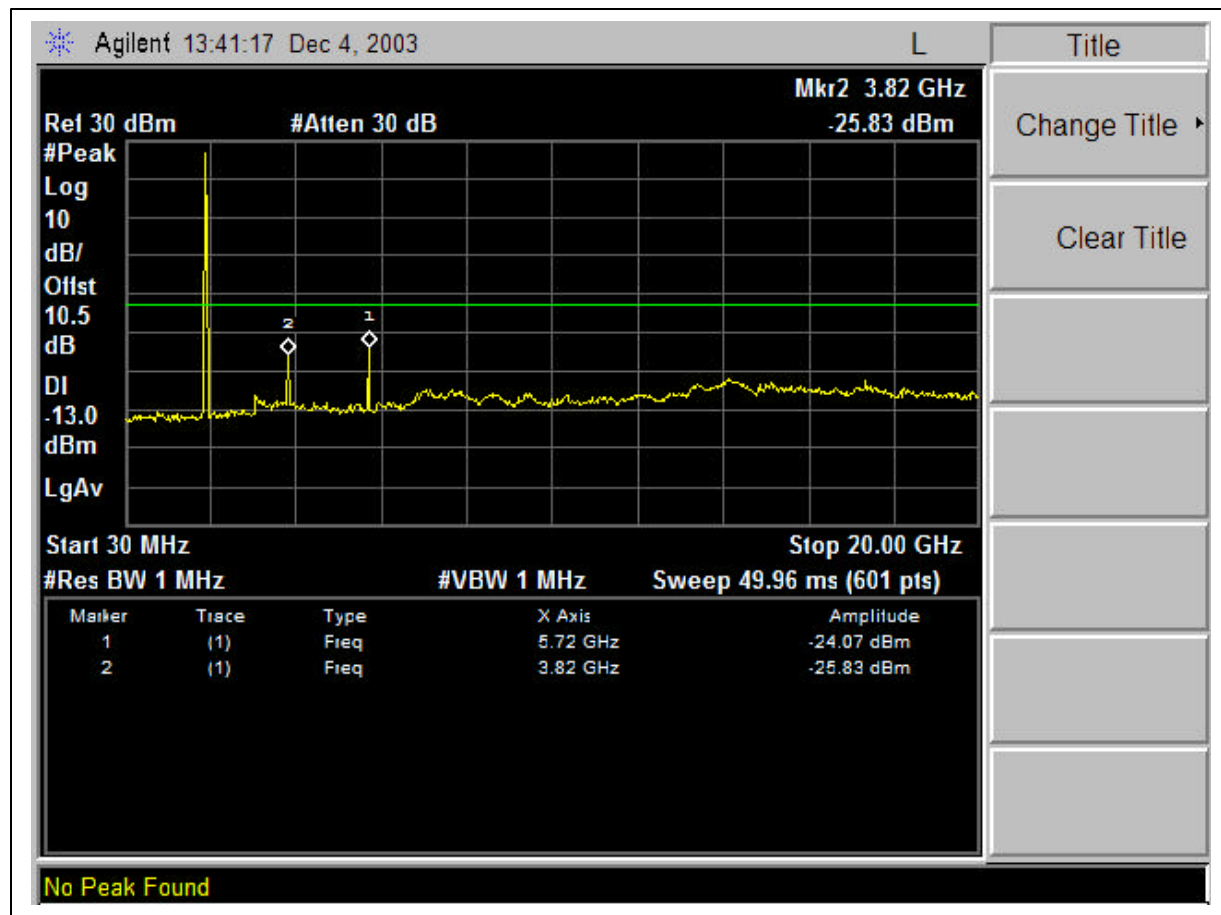
MID CHANNEL OUT OF EMISSION



LOW CHANNEL BAND EDGE



HI CHANNEL OUT OF EMISSION



7.5. SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

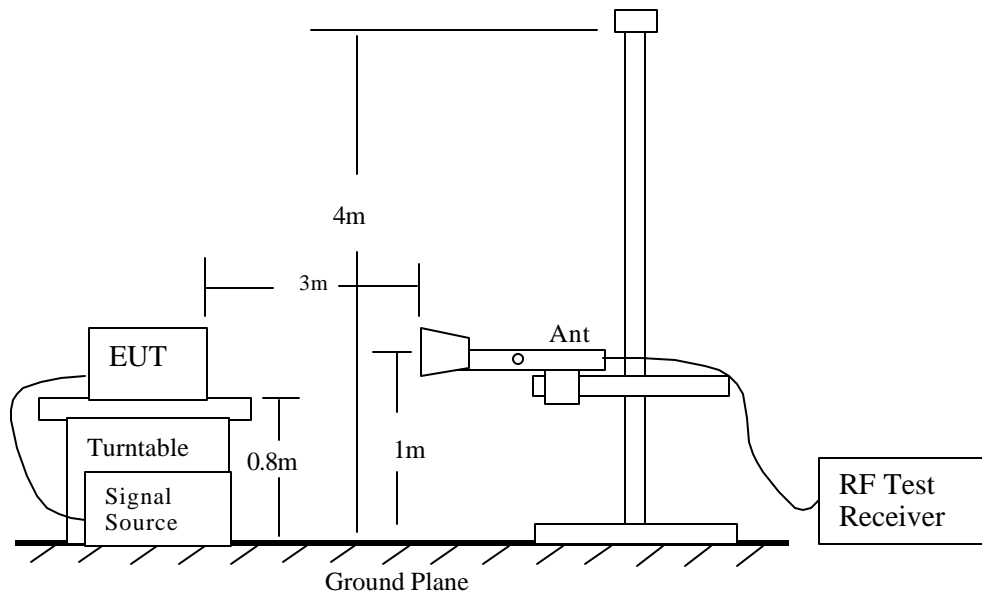
INSTRUMENTS LIST

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	US42070220	1/13/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	2/4/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/4/2004
Signal Generator, 10 MHz ~ 20 GHz	HP	83732B	US34490599	4/4/2004
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/25/2004
Peak Power Meter	Agilent	E4416A	GB41291160	11/7/2004

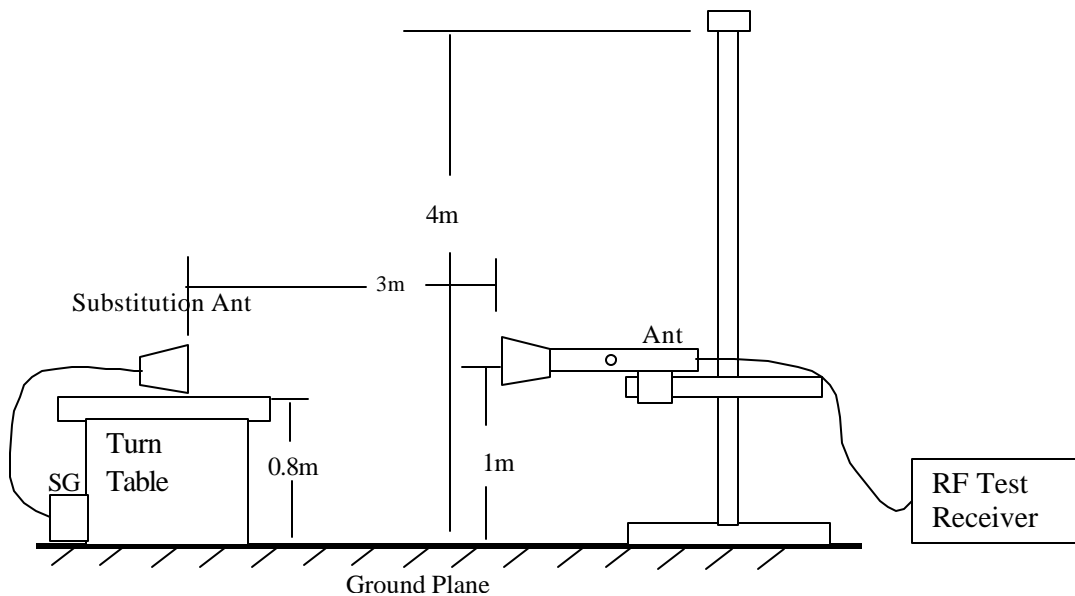
Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	<input checked="" type="checkbox"/> Peak <input type="checkbox"/> Average	<input checked="" type="checkbox"/> 1 MHz <input type="checkbox"/> 1 MHz	<input checked="" type="checkbox"/> 1 MHz <input type="checkbox"/> 10 Hz

TEST SETUP



Radiated Emission Measurement



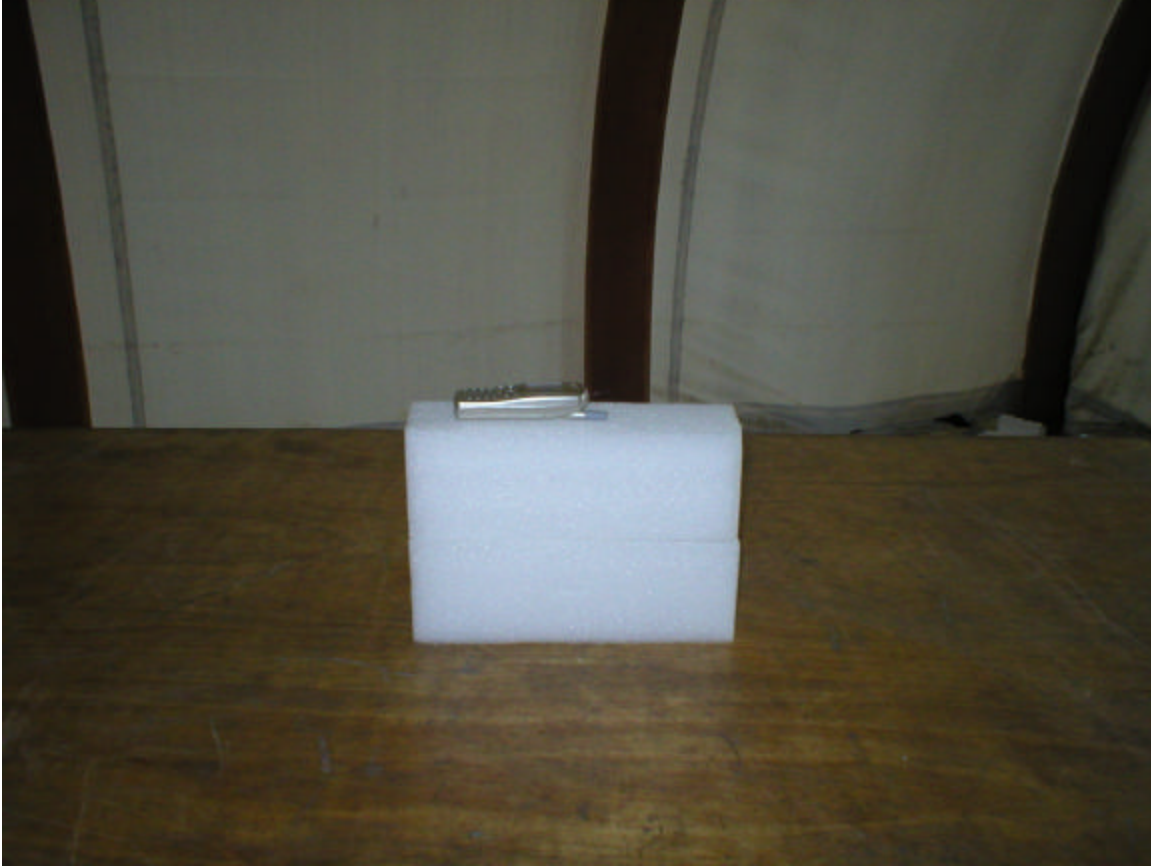
Radiated Emission – Substitution Method set-up

TEST PROCEDURE

- 1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
- 2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.
- 3). The output of the test antenna shall be connected to the measuring receiver and either a peak or average detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- 4). The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- 5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 6). The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 8). The maximum signal level detected by the measuring receiver shall be noted.
- 9). The transmitter shall be replaced by a substitution antenna.
- 10). The substitution antenna shall be oriented for vertical polarization.
- 11). The substitution antenna shall be connected to a calibrated signal generator.
- 12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
- 17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

RESULT

No non-compliance noted, as shown below



CDMA: Low, Mid, & High Channels:

12/05/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site									
Test Engr: VIEN TRAN Project #: 03I2380-1 Company: COMPAL ELECTRONICS, INC. EUT Descrip.: 1900MHz CELLULAR PHONE HANDSET WITH FIXED ANTENNA EUT M/N: VP-5U Test Target: FCC PART 24 _SUBSTITUTION FOR HARMONIC & SPUR Mode Oper: THE ANTENNA OF EUT AT X POSIIONTION_ Tx AT L/M/H CHANNELS Test Equipment:									
EMCO Horn 1-18GHz T60; S/N: 2238 @ 3m		Pre-amplifier 1-26GHz T63 Miteq 646456		Spectrum Analyzer Agilent E4446A Analyzer		Horn > 18GHz		Limit EIRP	
Hi Frequency Cables <input type="checkbox"/> (2 ft) <input type="checkbox"/> (2 ~ 3 ft) <input checked="" type="checkbox"/> (4 ~ 6 ft) <input type="checkbox"/> (12 ft)				Peak Measurements: Fundamental: RBW>99% or 26dB Emissions BW Bandwidth: RBW=>1% Emissions BW Spurious: RBW=1MHz VBW=RBW VBW=> 3*RBW VBW=1MHz					
f GHz	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
LOW CH=1851.25MHz									
3.703	68.2	-37.2	0.8	9.5	7.3	-28.5	-13.0	-15.5	V
5.554	60.0	-46.5	1.0	11.1	9.0	-36.4	-13.0	-23.4	V
7.404	52.2	-38.8	1.2	11.2	9.1	-28.8	-13.0	-15.8	V, NOISE FLOOR
3.703	66.5	-38.4	0.8	9.5	7.3	-29.7	-13.0	-16.7	H
5.554	64.0	-39.5	1.0	11.1	9.0	-29.4	-13.0	-16.4	H
7.404	53.0	-38.6	1.2	11.2	9.1	-28.6	-13.0	-15.6	H, NOISE FLOOR
MID CH=1880MHz									
3.760	67.5	-37.2	0.8	9.5	7.4	-28.5	-13.0	-15.5	V
5.640	65.2	-40.2	1.0	11.2	9.0	-30.1	-13.0	-17.1	V
7.520	48.0	-45.5	1.2	11.2	9.1	-35.5	-13.0	-22.5	V, NOISE FLOOR
3.760	70.7	-34.3	0.8	9.5	7.4	-25.6	-13.0	-12.6	H
5.640	67.0	-36.2	1.0	11.2	9.0	-26.1	-13.0	-13.1	H
7.520	49.0	-42.5	1.2	11.2	9.1	-32.5	-13.0	-19.5	H, NOISE FLOOR
HI CH=1908.75MHz									
3.818	69.8	-35.0	0.8	9.5	7.4	-26.3	-13.0	-13.3	V
5.726	66.0	-39.0	1.0	11.2	9.0	-28.8	-13.0	-15.8	V
7.635	46.9	-48.6	1.2	11.2	9.1	-38.6	-13.0	-25.6	V, NOISE FLOOR
3.820	72.8	-32.4	0.8	9.5	7.4	-23.7	-13.0	-10.7	H
5.730	67.6	-36.5	1.0	11.2	9.1	-26.3	-13.0	-13.3	H
7.635	48.0	-45.7	1.2	11.2	9.1	-35.7	-13.0	-22.7	H, NOISE FLOOR

7.6. SECTION 2.1055: FREQUENCY STABILITY

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
EMI Receiver	HP	8593EM	6/11/03
Environmental Chamber	Thermotron	SE 600-10-10	4/26/04
Detector Function Setting of Test Receiver			
Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	Peak	300 Hz	300 Hz

TEST SETUP

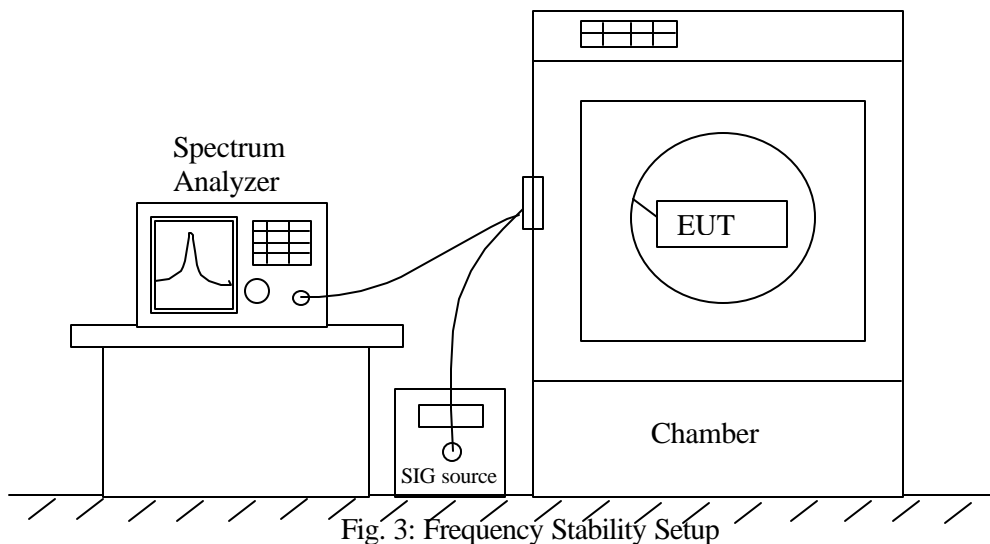
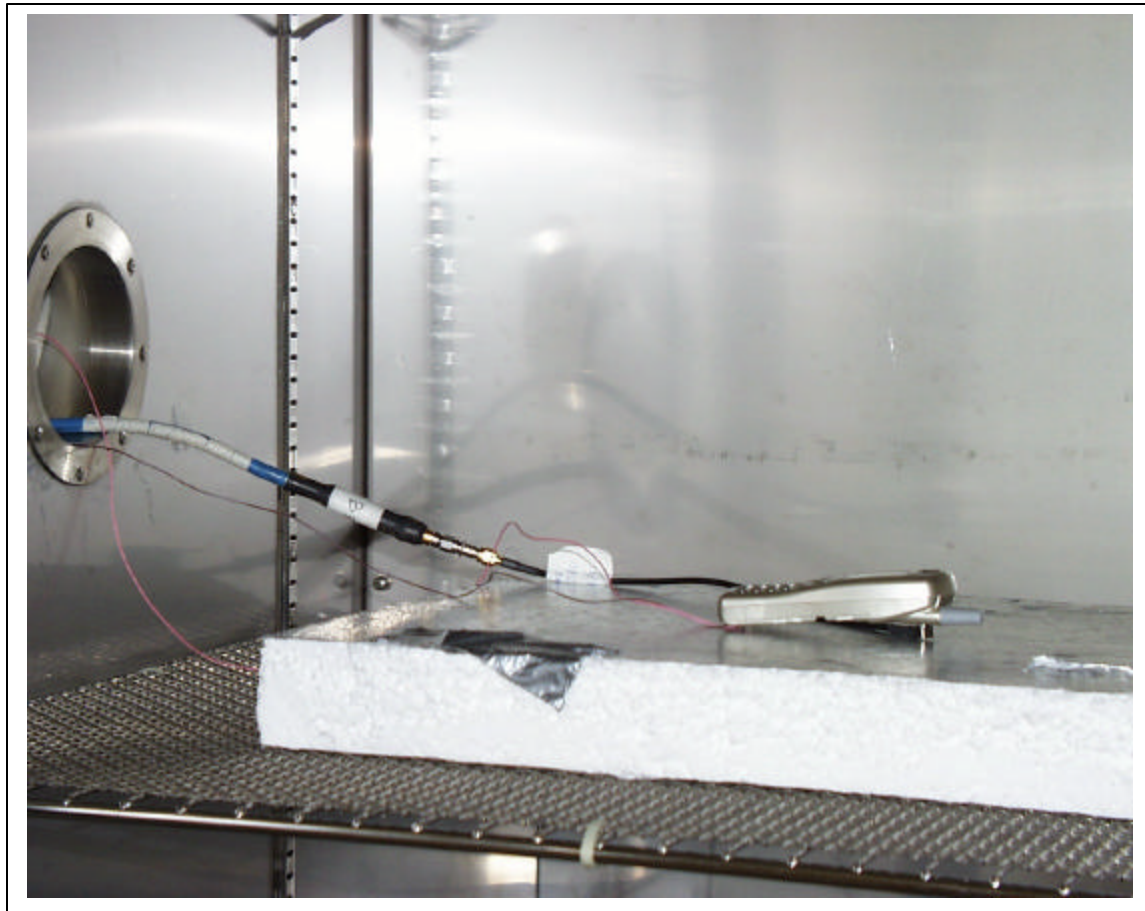


Fig. 3: Frequency Stability Setup



TEST PROCEDURE

- **Frequency stability versus environmental temperature**

- 1). Setup the configuration per figure 6 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 25°C. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
- 2). Turn EUT off and set Chamber temperature to -30°C.
- 3). Allow sufficient time (approximately 20 to 30 minus after chamber reach the assigned temperature) for EUT to stabilize. Turn on EUT and measure the EUT operating frequency. Turn off EUT after the measurement.
- 4). Repeat step 3 with a 10°C increased per stage until the highest temperature of +50°C reached, record all measured frequencies on each temperature step.

- **Frequency stability versus AC input voltage**

- 1). Setup the configuration per figure 6 and set chamber temperature to 25°C. Use a variable AC power supply to power the EUT and set AC output voltage to EUT nominal input AC voltage. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
- 2). Slowly reduce the EUT input voltage to specified extreme voltage variation ($\pm 15\%$) and record the maximum frequency change.

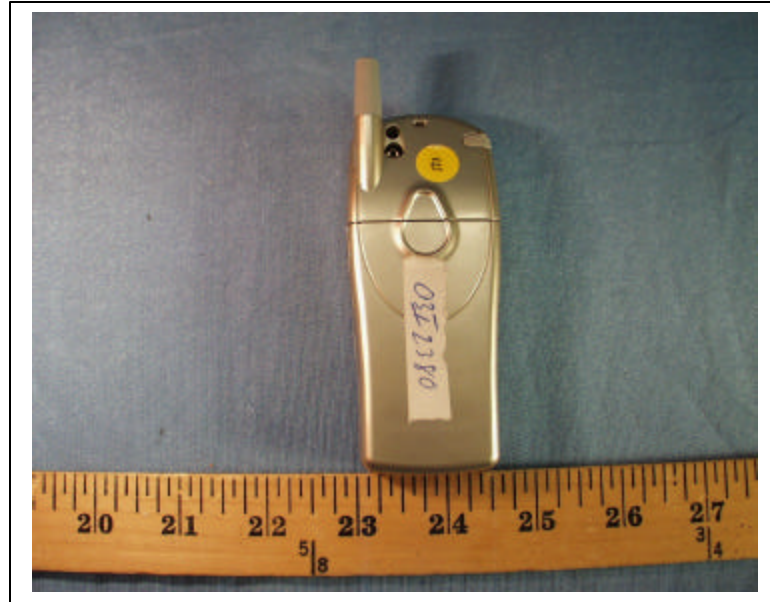
RESULT

No non-compliance noted, as shown below because the EUT uses the same OSC in both receiver and transmitter LO circuit. As a result, the frequency does not shift in Frequency Stability Test.

Reference Frequency: CDMA Mid Channel 1880.00000MHz @ 25°C				
Limit: to stay ± 2.5 ppm = 4701.721 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	1880.68847	-0.006	± 2.5
3.70	40	1880.68848	-0.012	± 2.5
3.70	30	1880.68848	-0.014	± 2.5
3.70	25	1880.68845	0	± 2.5
3.70	20	1880.68858	-0.068	± 2.5
3.70	10	1880.68846	-0.004	± 2.5
3.70	0	1880.68855	-0.053	± 2.5
3.70	-10	1880.68867	-0.114	± 2.5
3.70	-20	1880.68856	-0.055	± 2.5
3.70	-30	1880.68935	-0.476	± 2.5
3.00 - 3.15 (end point)	25	1880.69301	-2.422	± 2.5
4.14	25	1880.68828	0.091	± 2.5

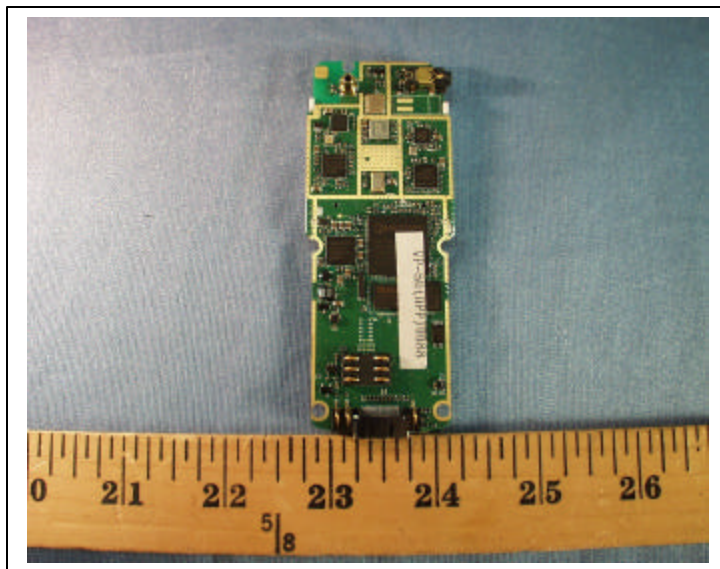
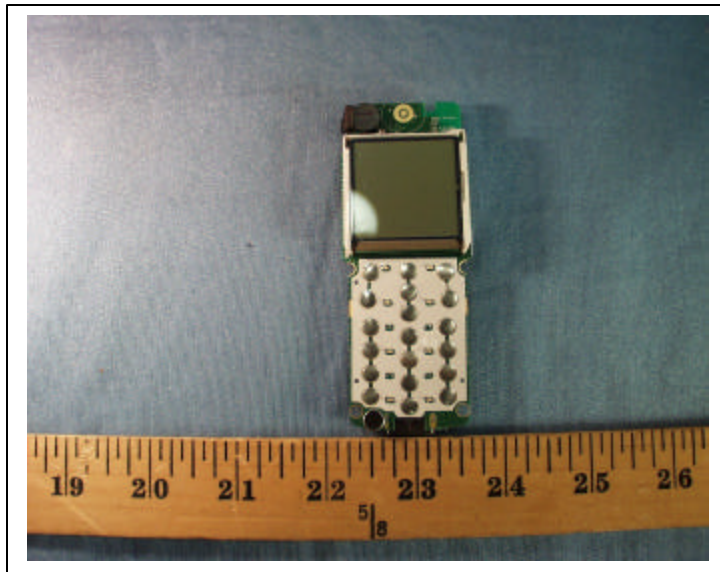
8. APENDIX

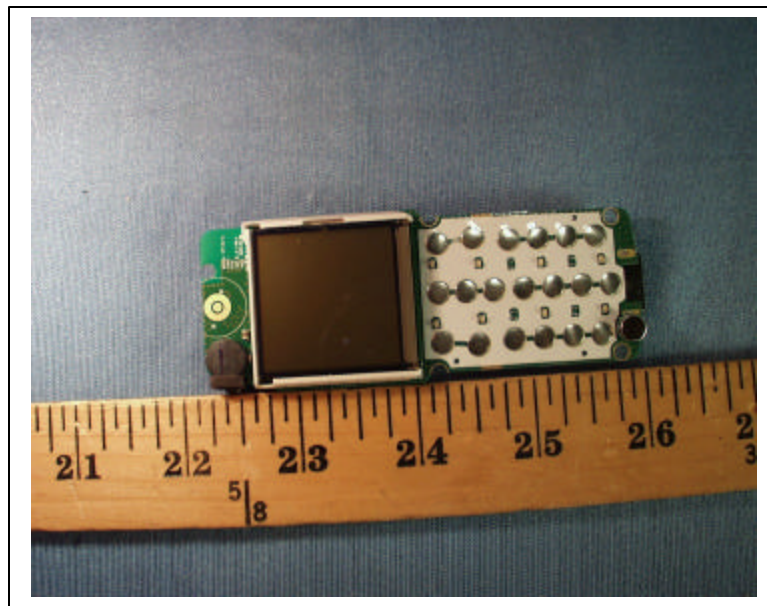
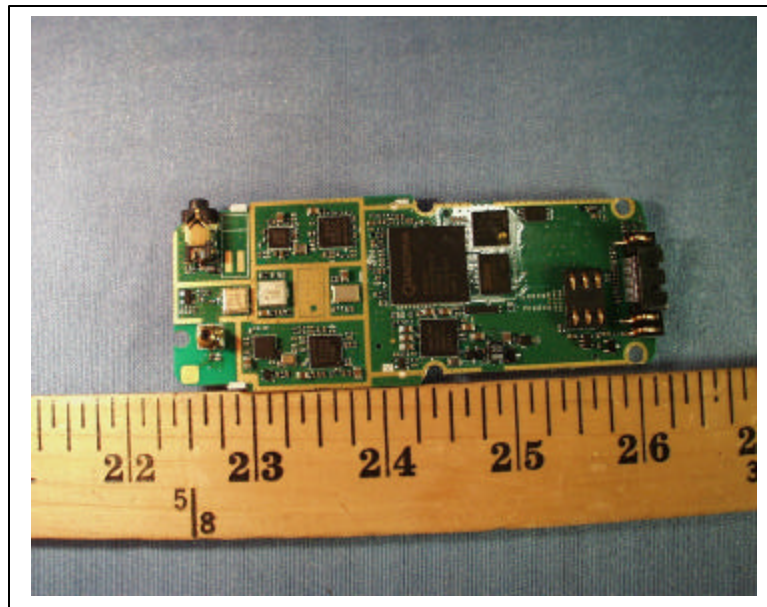
8.1. EXTERNAL & INTERNAL PHOTOS











8.2. SCHEMATICS

Please refer to attached sheets.

8.3. BLOCK DIAGRAM

Please refer to attached sheets.

8.4. USER MANUAL

Please refer to attached sheets.

END OF REPORT