FCC CFR47 CERTIFICATION

PART 24E

TEST REPORT

FOR

GSM Tri-band 900/1800/1900MHz Cellular Phone

MODEL: MCX-608

FCC ID: R8QMCX-608

REPORT NUMBER: 04U3001-1

ISSUE DATE: SEPTEMBER 25, 2004

Prepared for
MACRONIX AMERICA INC.
491 FAIRVIEW WAY
MILPITAS, CA 95035, USA

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD, ROUTE 2
MORGAN HILL, CA 95037, USA
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TABLE OF CONTENT

1. TEST RESULT CERTIFICATION

COMPANY NAME: MACRONIX AMERICA INC.
491 FAIRVIEW WAY
MILPITAS, CA 95035, USA

EUT DESCRIPTION: GSM Tri-band 900/1800/1900MHz Cellular Phone

MODEL NUMBER: MCX-608

DATE TESTED: 9/23/2004 – 9/25/2004

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR, LICENSED TX MODULE IN MOBILE APPLICATION
MEASUREMENT PROCEDURE	ANSI C63.4 / 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 24 Subpart E-Broadband PCS. The equipment in the configuration 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:

WILLIM ZHUANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The device has built in Tri-Band GSM900, DCS1800, and PCS1900 cellular antenna embedded in the only PCS used in the U.S. for this product.

The EUT of GSM1900 has an output power of 30.2dBm / 1.047W (EIRP) which is designed for the bands transmitting of frequency range 1850.2MHz to 1909.8MHz.

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 open area test sites and conducted 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

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E4446A	MY43360112	1/13/05
DC Power Supply	Kenwood	PA36-3A	7060074	N/A
Bilog Antenna	A.R.A.	LPB 2520/A	1185	3/6/05
Tune Dipole	ETS	DB-4	1629	5/14/05
Tx Horn Antenna	EMCO	3115	6739	2/4/2005
Rx Horn Antenna	EMCO	3115	6717	2/4/2005
Amplifier	MITEQ	NSP2600-SP	924342	4/25/2005
HPF	MICROLAB	FH-2400H	N/A	N/A

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 the measuring receiver detects a maximum signal level.

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 tuned dipole / horn (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.

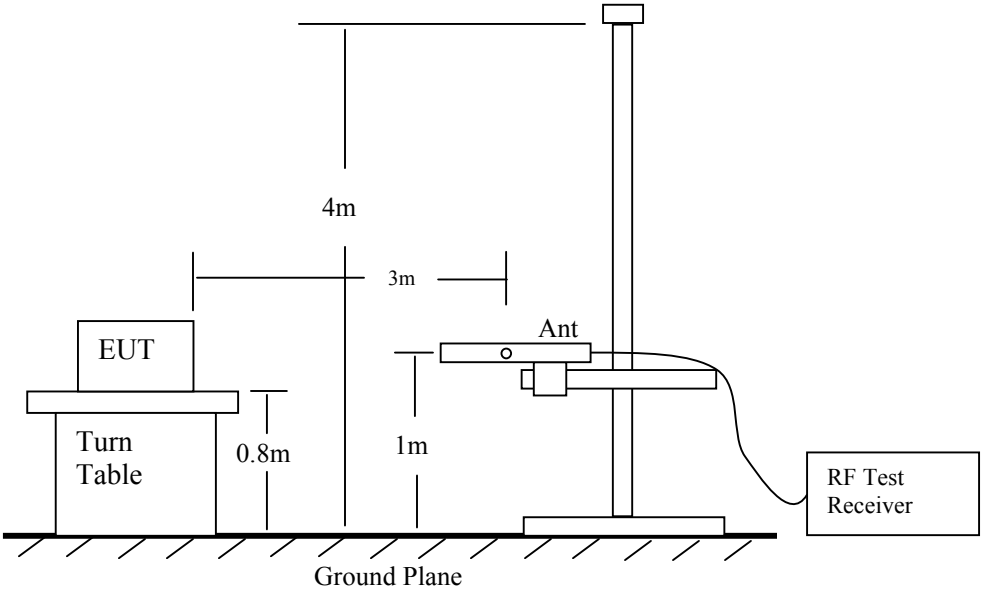
13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

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.

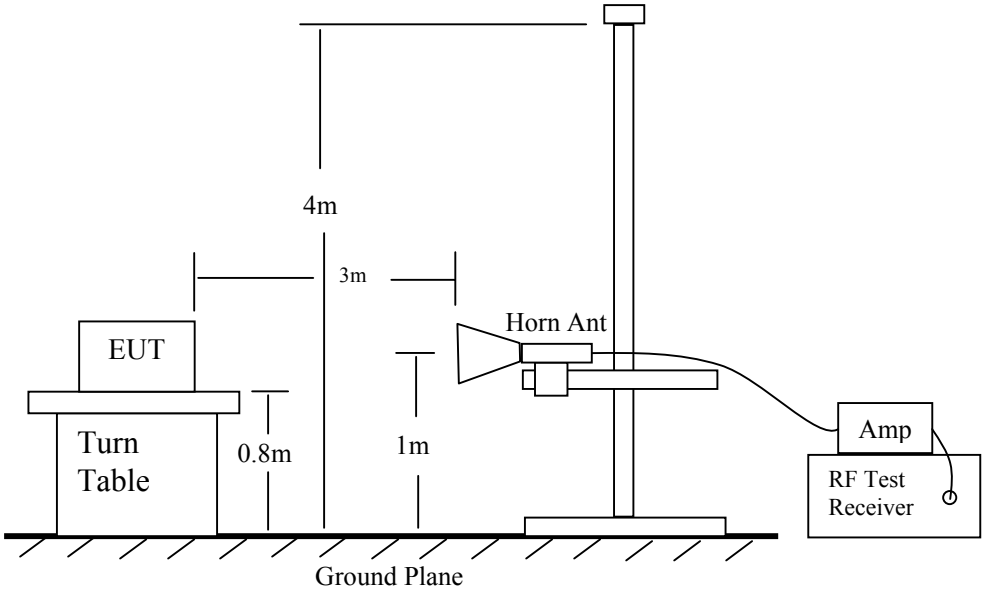
15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

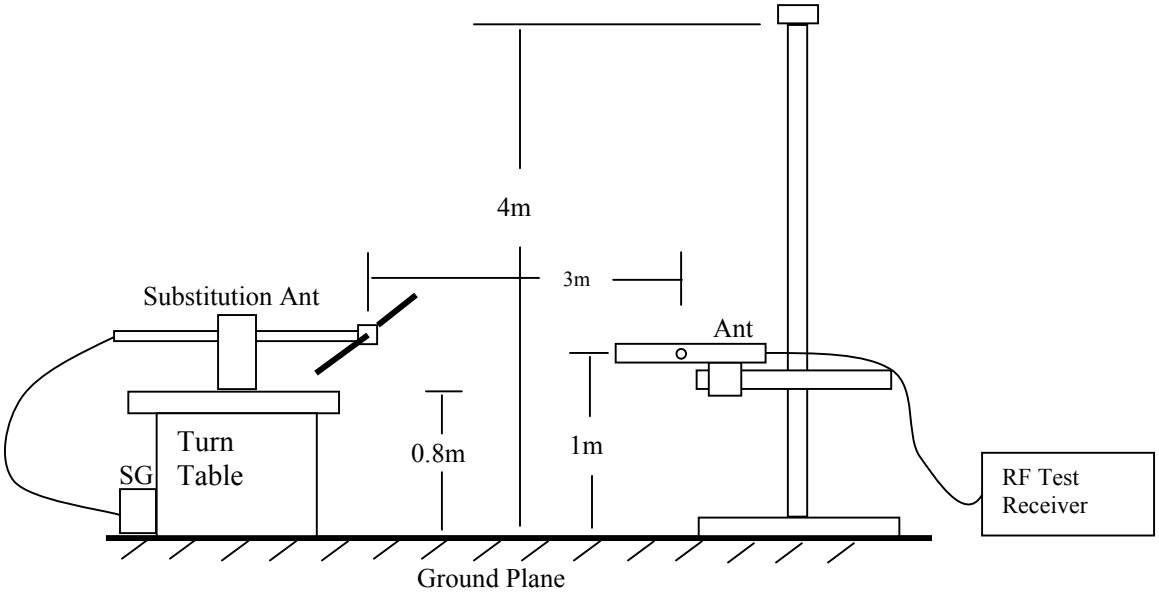
17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

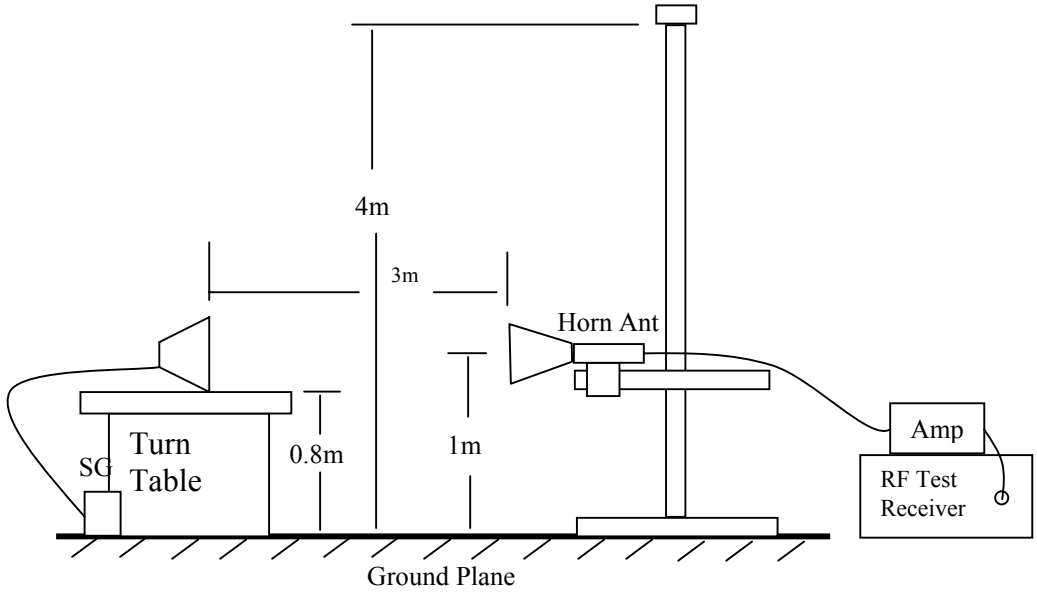


Radiated Emission Measurement 30 to 1000 MHz



Radiated Emission Above 1000 MHz





Radiated Emission – Substitution Method Set-up

Radiated Emissions

X –Orientation

Y –Orientation

Z–Orientation

MEASUREMENT RESULT:

Output Power (EIRP) at worst X-Position:

09/23/04 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr:William Zhuang
Project #:04U3001-1
Company:7 Layers, Inc.
EUT Descrip.:GSM Tri-Band 900/1800/1900 MHz Cellular Phone
EUT M/N:MCX-608
Test Target:FCC Part24
Mode Oper:PCS, Transmit

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: FCC 24
Hi Frequency Cables: (2 ft) (2 ~ 3 ft) (4 ~ 6 ft) (12 ft)
Pre-amplifer 1-26GHz:
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Worst case at X position										
1.850	93.3	V	17.6	1.4	7.8	5.7	24.1	33.0	-8.9	X position, Low Ch.
1.850	101.3	H	23.7	1.4	7.8	5.7	30.2	33.0	-2.8	X position, Low Ch.
1.880	94.1	V	18.6	1.4	7.9	5.7	25.1	33.0	-7.9	X position, Mid Ch.
1.880	100.2	H	22.8	1.4	7.9	5.7	29.3	33.0	-3.7	X position, Mid Ch.
1.910	95.1	V	19.7	1.4	7.9	5.8	26.2	33.0	-6.8	X position, High Ch.
1.910	100.6	H	23.3	1.4	7.9	5.8	29.8	33.0	-3.2	X position, High Ch.

7.2. SECTION 2.1047: MODULATION CHARACTERISTICS

Not applicable.

7.3. SECTION 2.1049: OCCUPIED BANDWIDTH

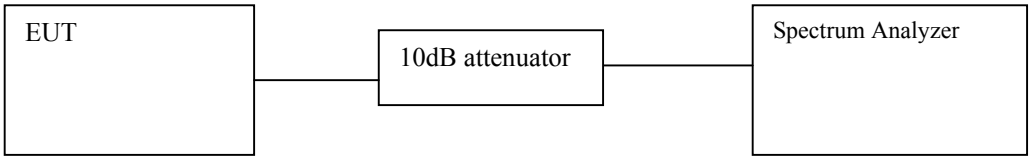
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E4446A	MY43360112	1/13/05
10dB Attenuator	Agilent	8493C	59028	N/A
DC Power Supply	Kenwood	PA36-3A	7060074	N/A

TEST PROCEDURE

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RES BW was set to about 1% of emission BW, -26 dBc display line was placed on the screen, the occupied BW is the delta frequency between the two points where the display line intersects the signal trace. 26dB BW was measured for low, middle and high channels.

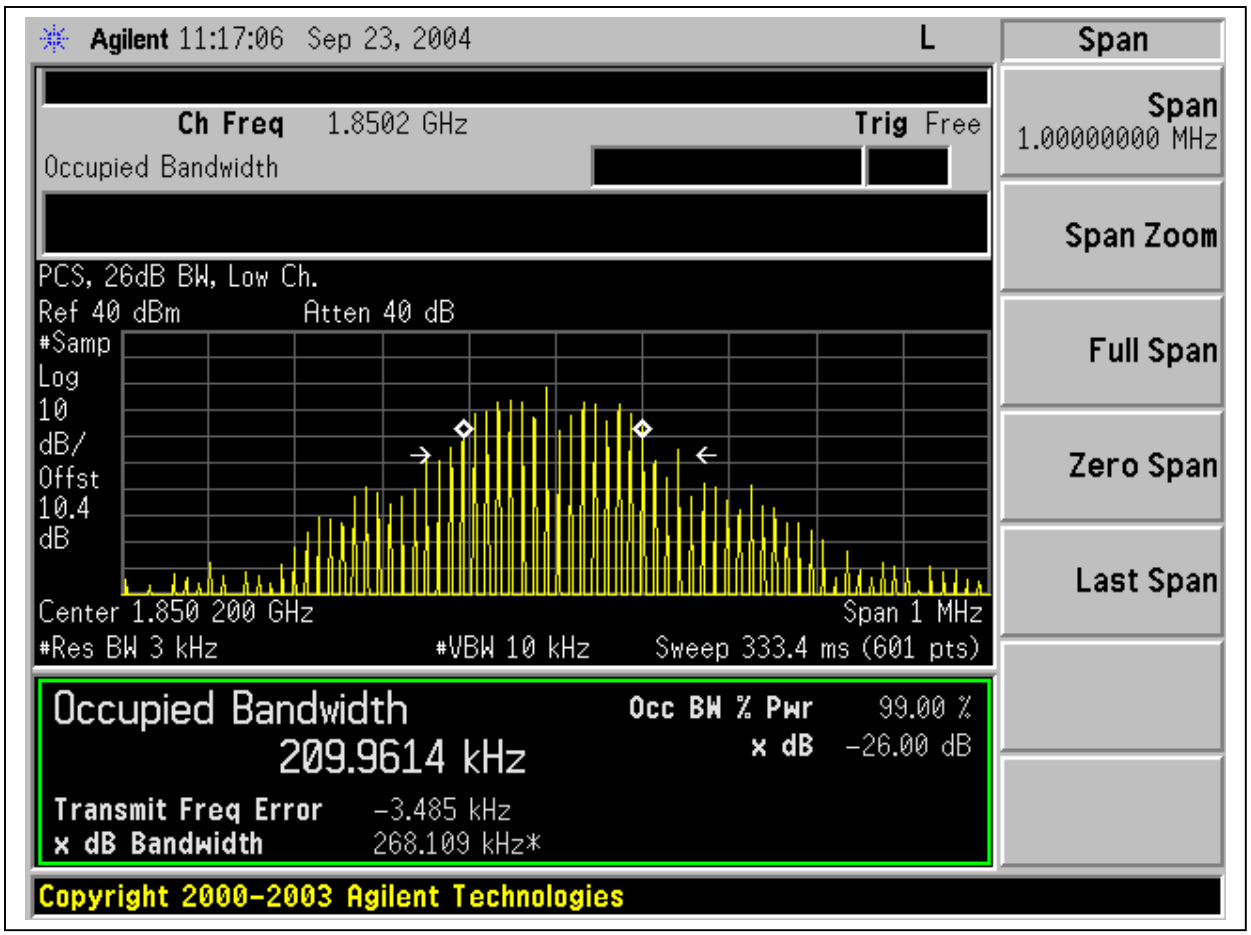
TEST SETUP



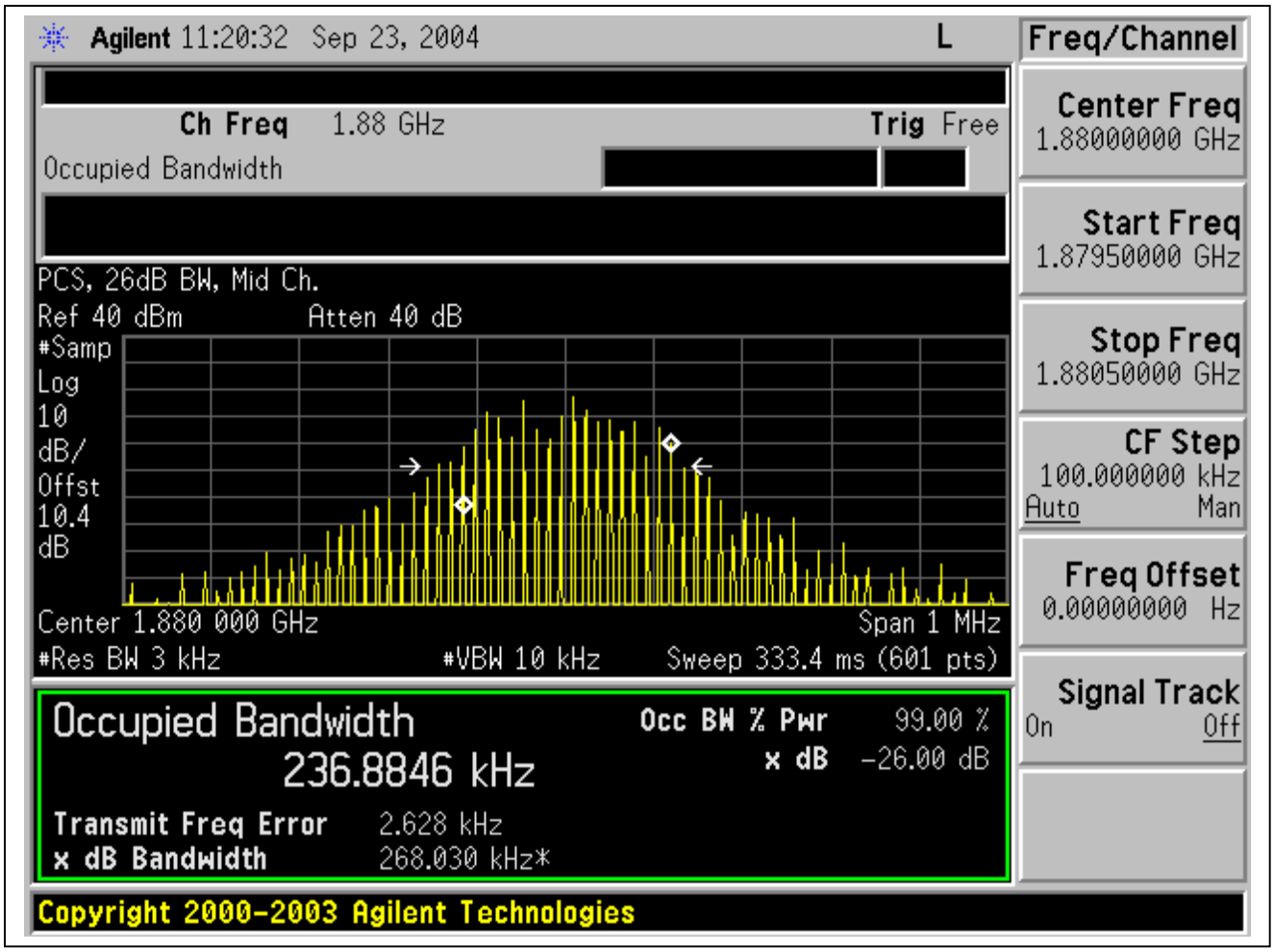
RESULT

Channel	Frequency (MHz)	-26dBc BW (KHz)
Low	1850.2	268.109
Middle	1880.0	268.030
High	1909.8	268.149

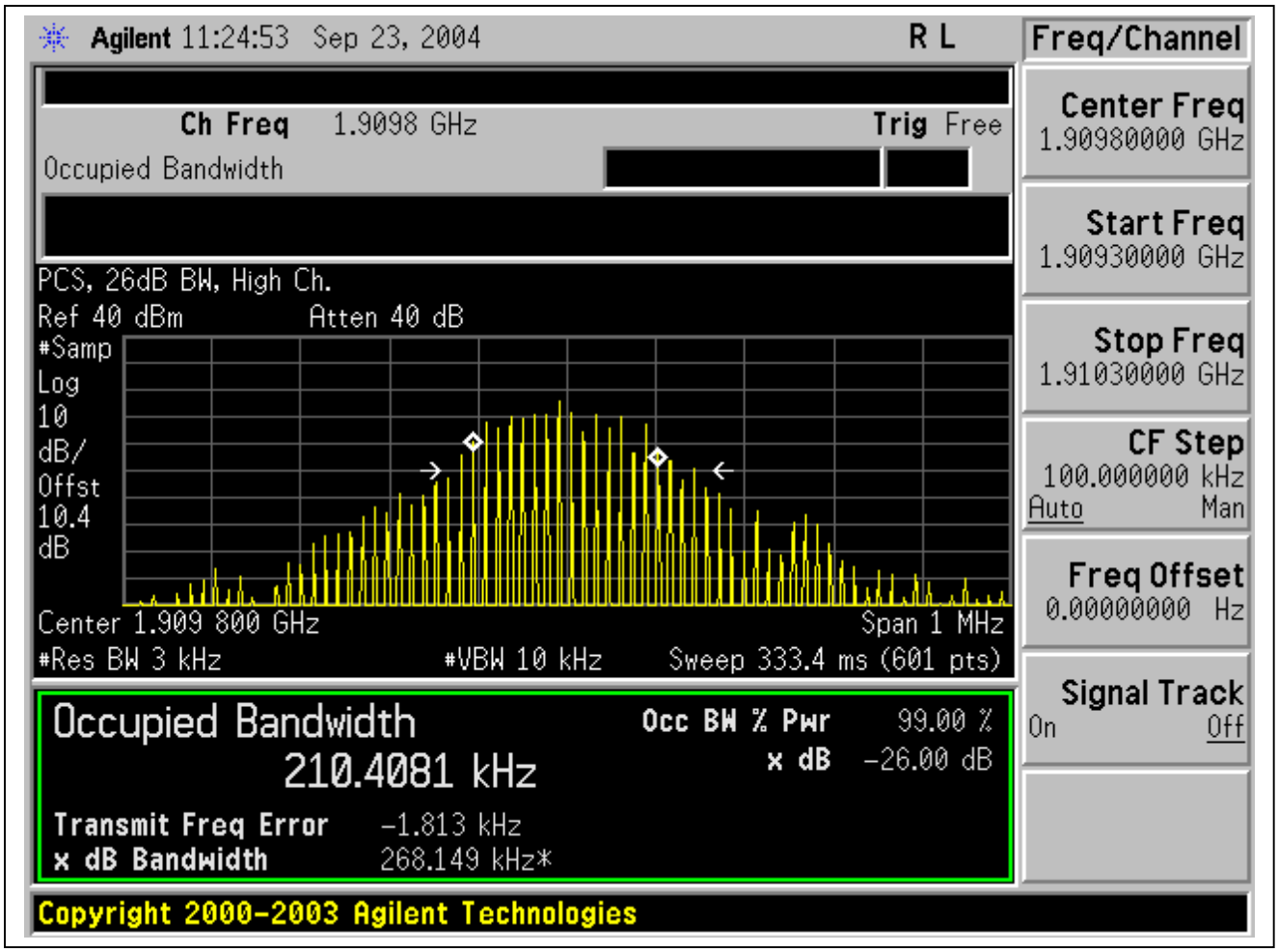
Low Channel



Mid Channel



High Channel

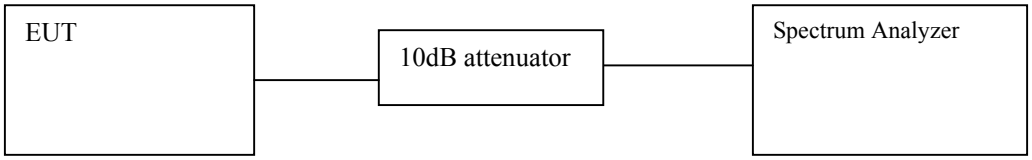


7.4. SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E4446A	MY43360112	1/13/05
10dB Attenuator	Agilent	8493C	59028	N/A
DC Power Supply	Kenwood	PA36-3A	7060074	N/A

TEST SETUP



TEST PROCEDURE

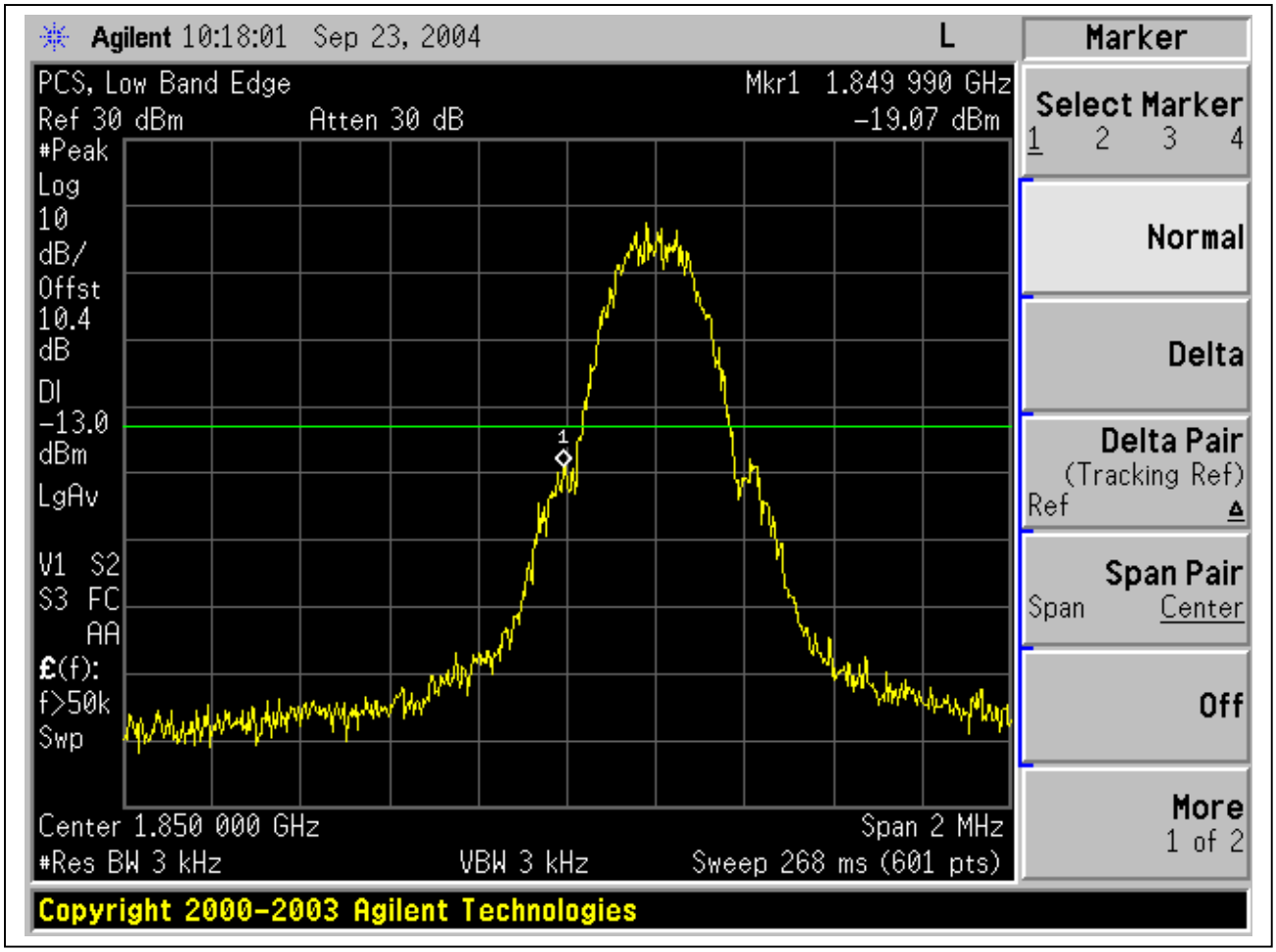
1) EUT's RF output connector (made solely for the purpose of the test) is connected to the spectrum analyzer, and set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge. Set the RES BW to 1% of the emission bandwidth to show compliance with 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 10xfo of the fundamental carrier for all frequency block. A display line was placed at –13dBm to show compliance for spurious, and harmonics.

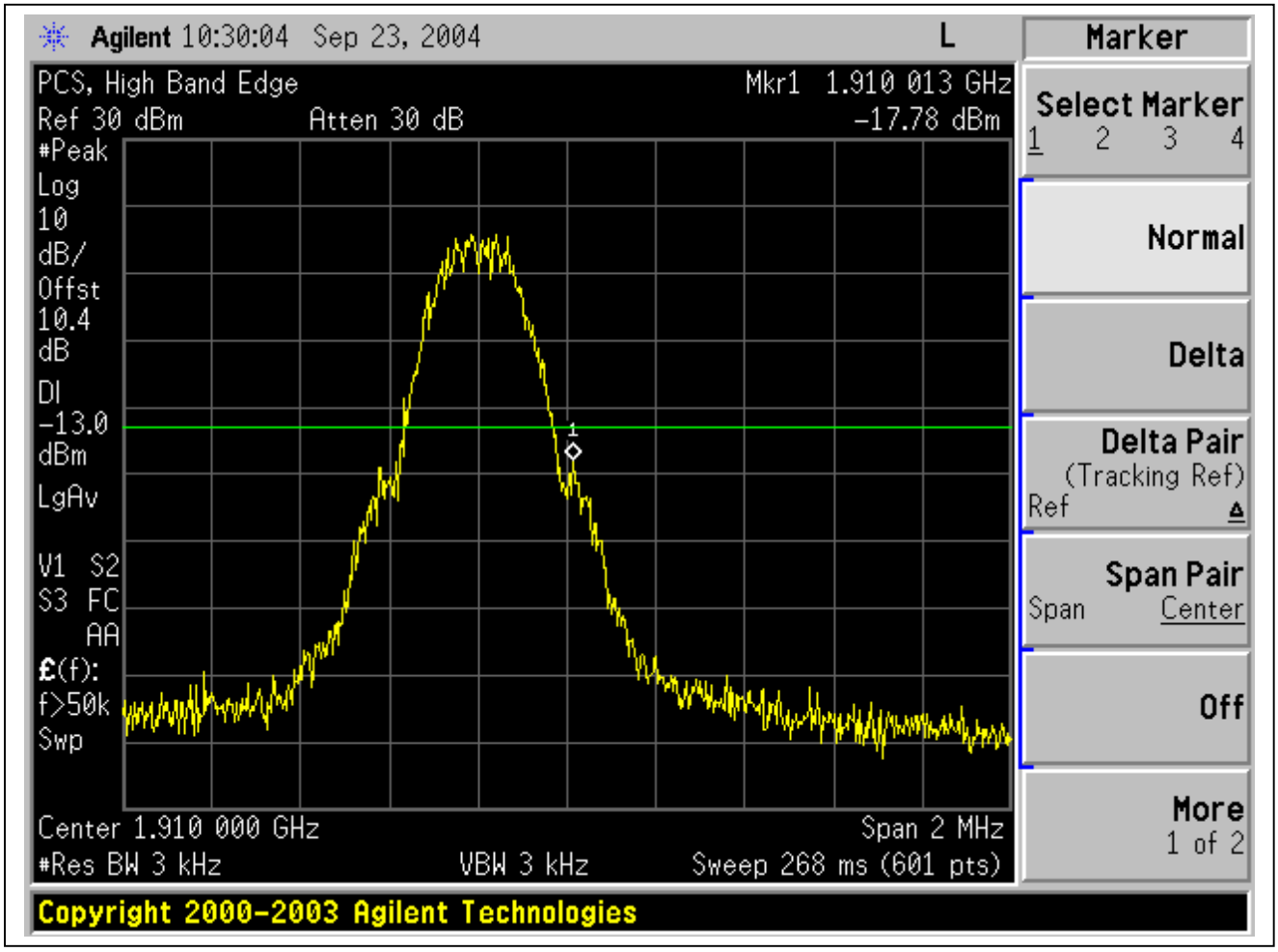
MEASUREMENT RESULT:

Low / High Band Edges, Low / Mid / High Out-Of-Band Emissions:

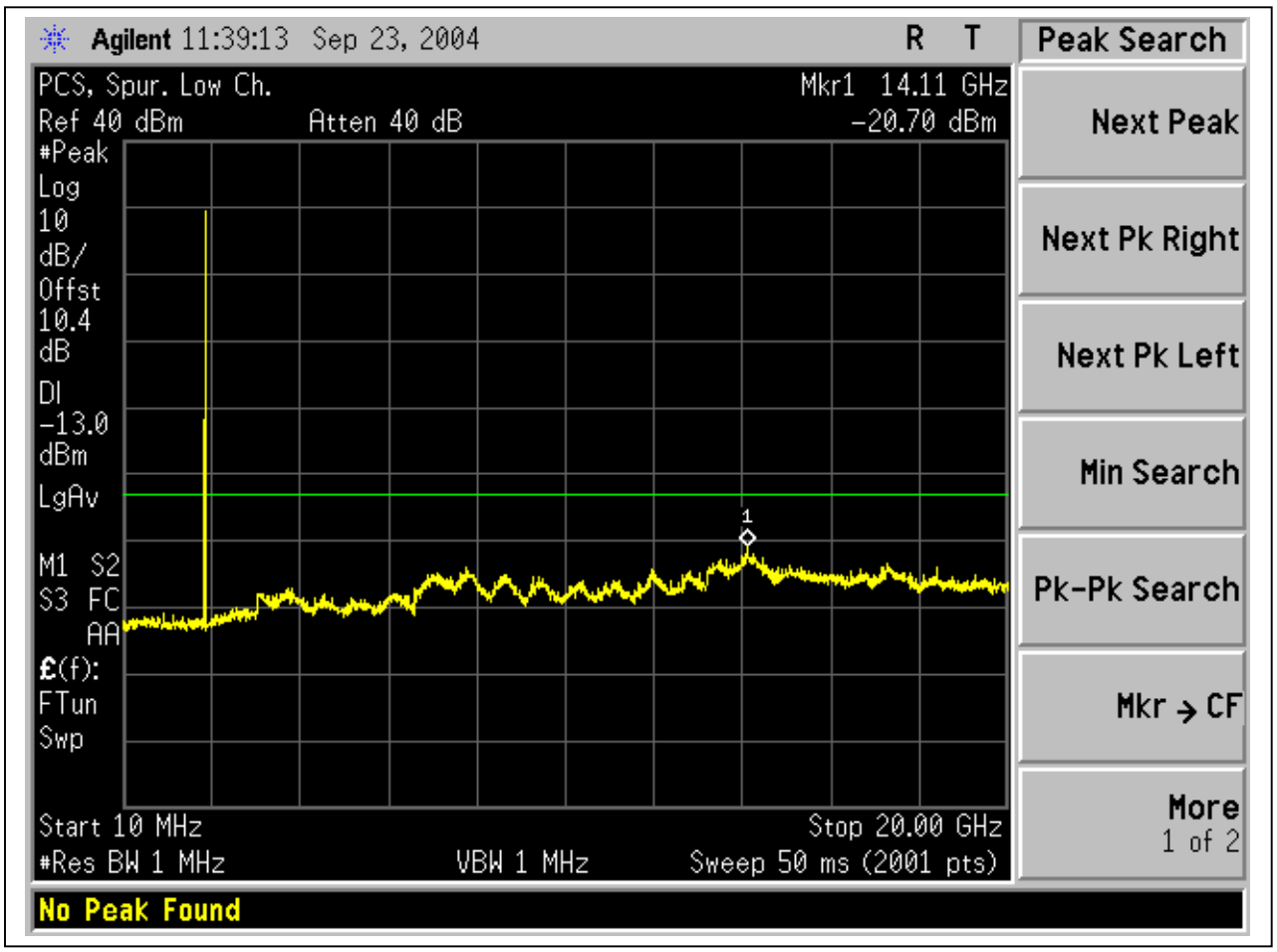
Low Band Edge- Ch 512 (Low Channel)



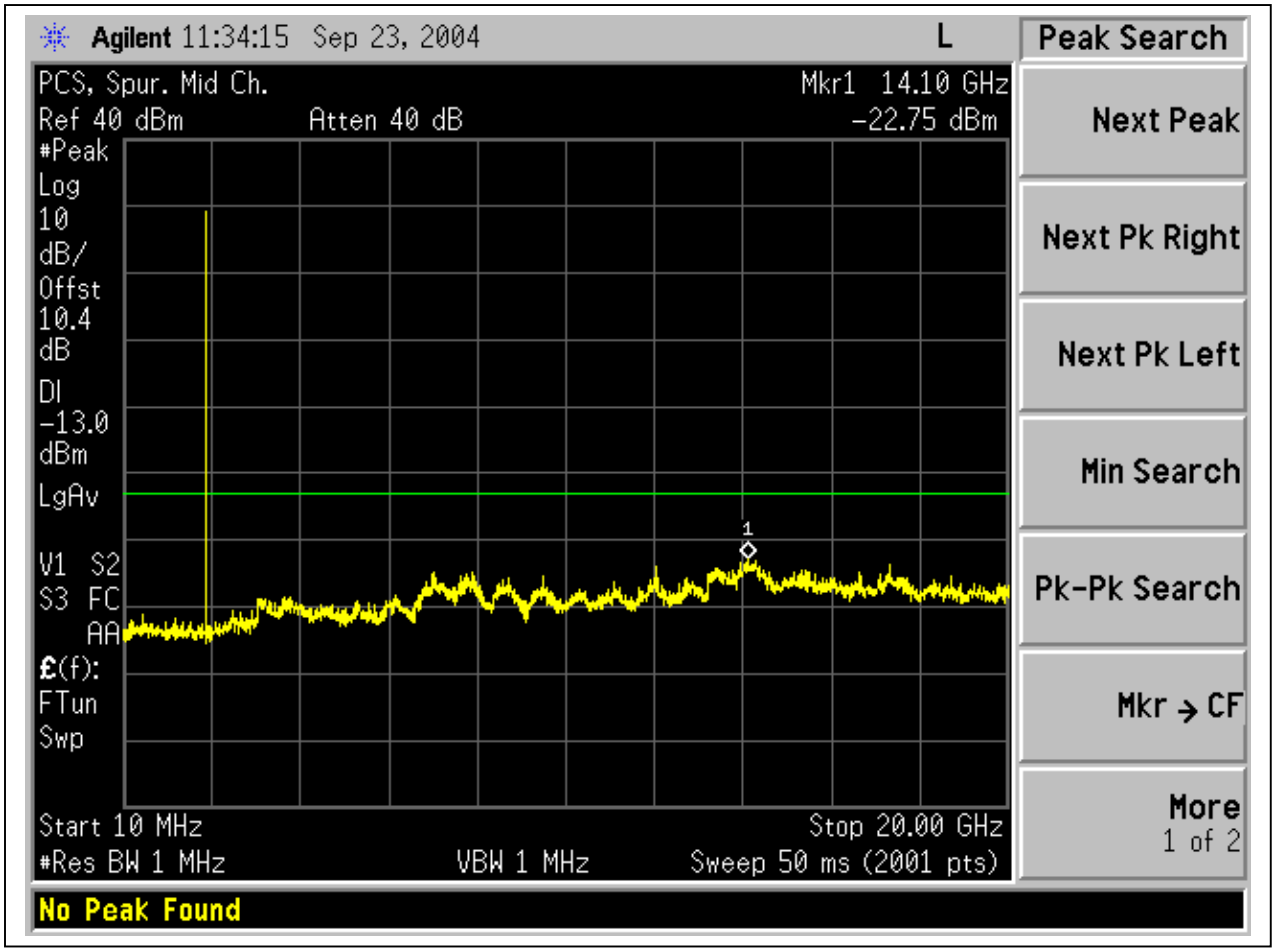
High Band Edge- Ch 810 (High Channel)



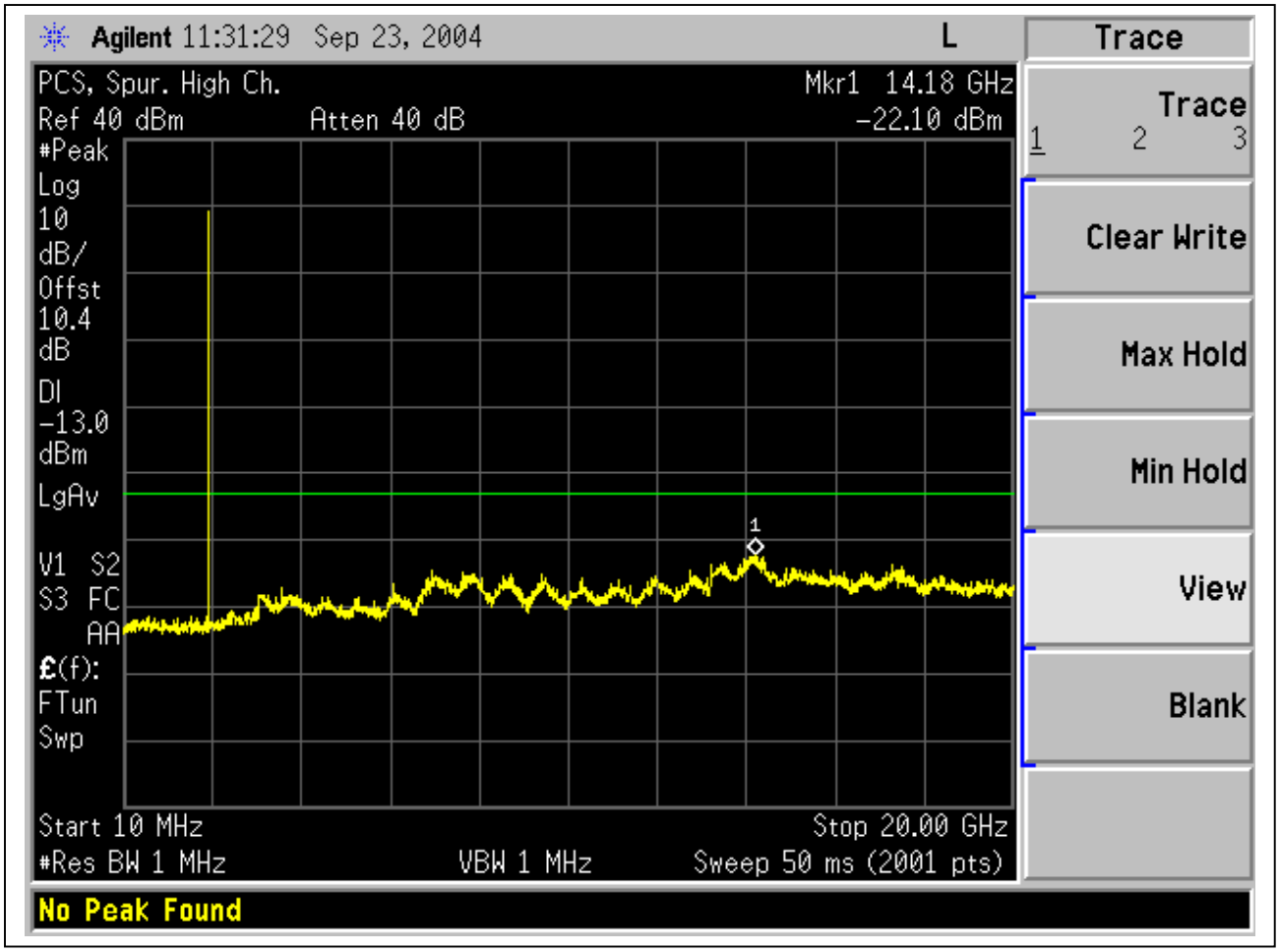
Out-Of-Band Emissions-Low Channel



Out-Of-Band Emissions-Mid Channel



Out-Of-Band Emissions-High Channel



7.5. SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

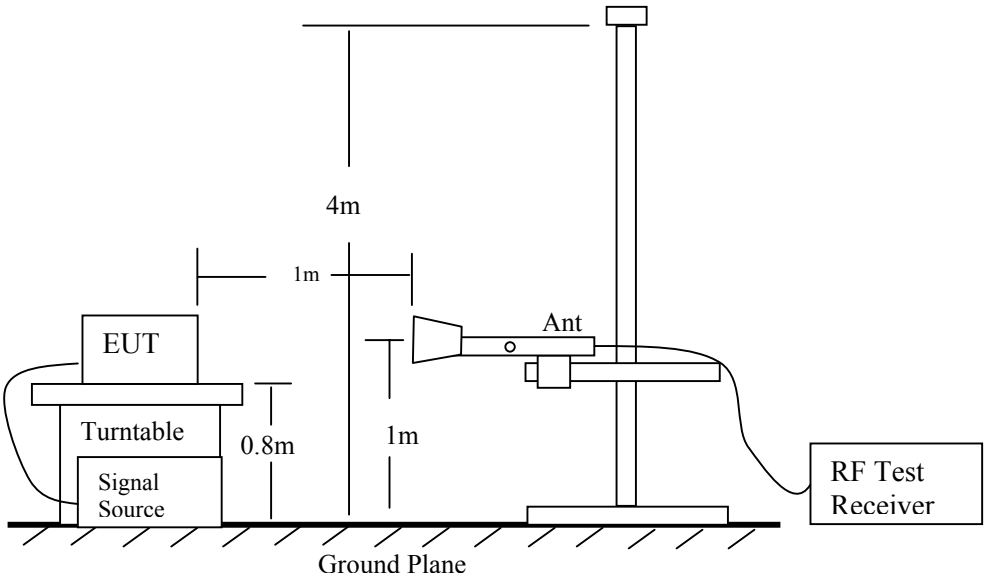
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E4446A	MY43360112	1/13/05
DC Power Supply	Kenwood	PA36-3A	7060074	N/A
Bilog Antenna	A.R.A.	LPB 2520/A	1185	3/6/05
Tune Dipole	ETS	DB-4	1629	5/14/05
Tx Horn Antenna	EMCO	3115	6739	2/4/2005
Rx Horn Antenna	EMCO	3115	6717	2/4/2005
Amplifier	MITEQ	NSP2600-SP	924342	4/25/2005
HPF	MICROLAB	FH-2400H	N/A	N/A

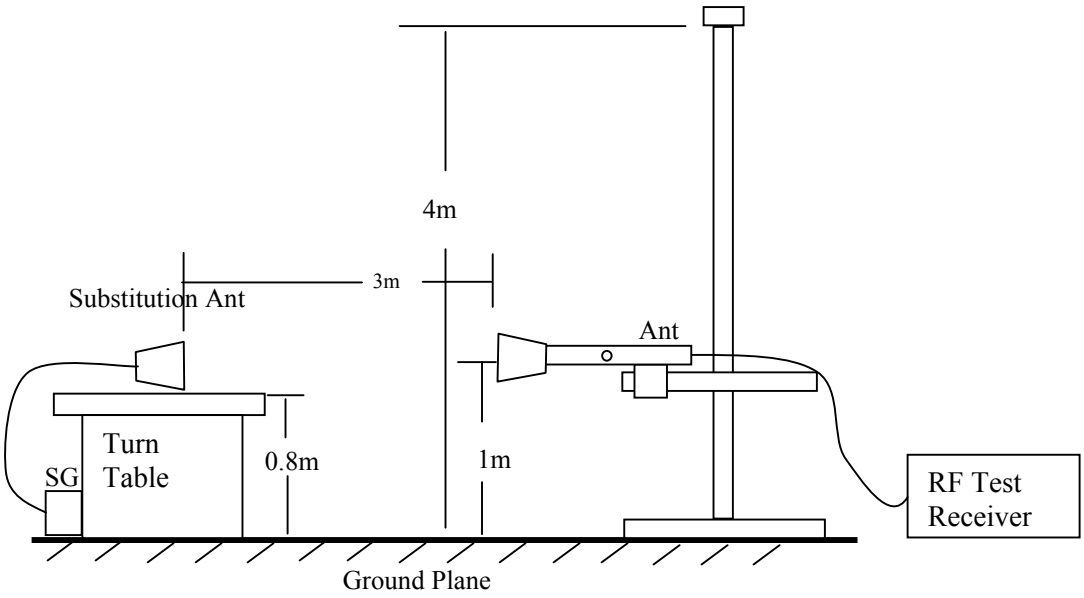
Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 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 1m 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 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 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.

MEASUREMENT RESULT

No non-compliance noted, as shown below

Radiated Emission Setup Photos:

Harmonics & Spurious Emissions: Low, Mid, & High Channels:

09/24/04 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr:William Zhuang
Project #:04U3001-1
Company:7 Layers, Inc.
EUT Descrip.:GSM Tri-Band 900/1800/1900 MHz Cellular Phone
EUT M/N:MCX-608
Test Target:FCC Part24
Mode Oper:PCS, Transmit

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: FCC 24
High Pass Filter
Hi Frequency Cables: (2 ft) (2 ~ 3 ft) (4 ~ 6 ft) (12 ft)
Pre-amplifer 1-26GHz: T87 Miteq 924342
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch. 512:										
3.700	85.6	V	-24.5	2.5	9.6	7.4	-17.4	-13.0	-4.4	
3.700	87.9	H	-25.7	2.5	9.6	7.4	-18.6	-13.0	-5.6	
5.550	77.3	V	-34.4	3.3	11.1	9.0	-26.6	-13.0	-13.6	
5.550	76.2	H	-35.0	3.3	11.1	9.0	-27.2	-13.0	-14.2	
7.400	77.3	V	-29.9	3.7	11.6	9.4	-22.0	-13.0	-9.0	
7.400	72.7	H	-42.7	3.7	11.6	9.4	-34.8	-13.0	-21.8	
9.250	79.0	V	-35.2	4.0	10.5	8.4	-28.7	-13.0	-15.7	
9.250	76.1	H	-42.7	4.0	10.5	8.4	-36.2	-13.0	-23.2	
11.100	80.0	V	-44.7	4.5	12.7	10.5	-36.6	-13.0	-23.6	
11.100	73.4	H	-52.6	4.5	12.7	10.5	-44.5	-13.0	-31.5	
12.950	55.9	V	-69.8	5.0	13.2	11.1	-61.5	-13.0	-48.5	
12.950	51.6	H	-74.0	5.0	13.2	11.1	-65.7	-13.0	-52.7	
Mid Ch. 661:										
3.760	79.3	V	-30.9	2.5	9.6	7.4	-23.8	-13.0	-10.8	
3.760	86.3	H	-27.2	2.5	9.6	7.4	-20.1	-13.0	-7.1	
5.640	77.0	V	-34.6	3.3	11.2	9.0	-26.8	-13.0	-13.8	
5.640	68.1	H	-43.2	3.3	11.2	9.0	-35.4	-13.0	-22.4	
7.520	78.4	V	-28.9	3.7	11.5	9.4	-21.1	-13.0	-8.1	
7.520	74.7	H	-40.7	3.7	11.5	9.4	-32.9	-13.0	-19.9	
9.400	76.5	V	-37.7	4.1	10.8	8.7	-31.0	-13.0	-18.0	
9.400	78.8	H	-40.0	4.1	10.8	8.7	-33.3	-13.0	-20.3	
11.280	80.1	V	-44.6	4.6	12.7	10.5	-36.5	-13.0	-23.5	
11.280	74.1	H	-51.9	4.6	12.7	10.5	-43.8	-13.0	-30.8	
13.160	51.0	V	-74.7	5.0	13.1	11.0	-66.6	-13.0	-53.6	
13.160	49.6	H	-76.0	5.0	13.1	11.0	-67.9	-13.0	-54.9	
High Ch. 810:										
3.820	78.5	V	-31.7	2.5	9.6	7.5	-24.6	-13.0	-11.6	
3.820	85.0	H	-28.6	2.5	9.6	7.5	-21.5	-13.0	-8.5	
5.730	78.4	V	-33.2	3.4	11.3	9.1	-25.3	-13.0	-12.3	
5.730	74.8	H	-36.4	3.4	11.3	9.1	-28.5	-13.0	-15.5	
7.639	73.4	V	-33.8	3.7	11.5	9.3	-26.0	-13.0	-13.0	
7.639	77.2	H	-38.2	3.7	11.5	9.3	-30.4	-13.0	-17.4	
9.549	79.3	V	-34.9	4.1	11.1	9.0	-27.9	-13.0	-14.9	
9.549	76.1	H	-42.7	4.1	11.1	9.0	-35.7	-13.0	-22.7	
11.459	75.3	V	-49.4	4.6	12.7	10.5	-41.4	-13.0	-28.4	
11.459	70.3	H	-55.7	4.6	12.7	10.5	-47.7	-13.0	-34.7	
13.369	61.2	V	-64.5	5.0	12.9	10.8	-56.6	-13.0	-43.6	
13.369	62.3	H	-63.3	5.0	12.9	10.8	-55.4	-13.0	-42.4	

7.6. SECTION 2.1055: FREQUENCY STABILITY

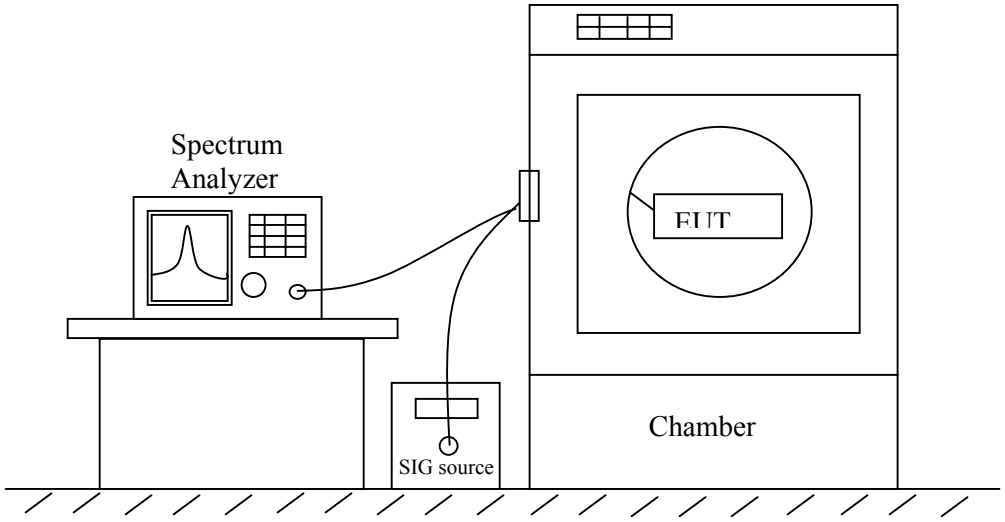
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E4446A	MY43360112	1/13/05
10dB Attenuator	Agilent	8493C	59028	N/A
Environmental Chamber	Thermotron	SE 600-10-10	2980	4/23/05
DC Power Supply	Kenwood	PA36-3A	7060074	N/A

DETECTOR SETTING OF TEST RECEIVER

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	Peak	300 Hz	300 Hz

TEST SETUP



Frequency Stability Setup

TEST PROCEDURE

- **Frequency stability versus environmental temperature**

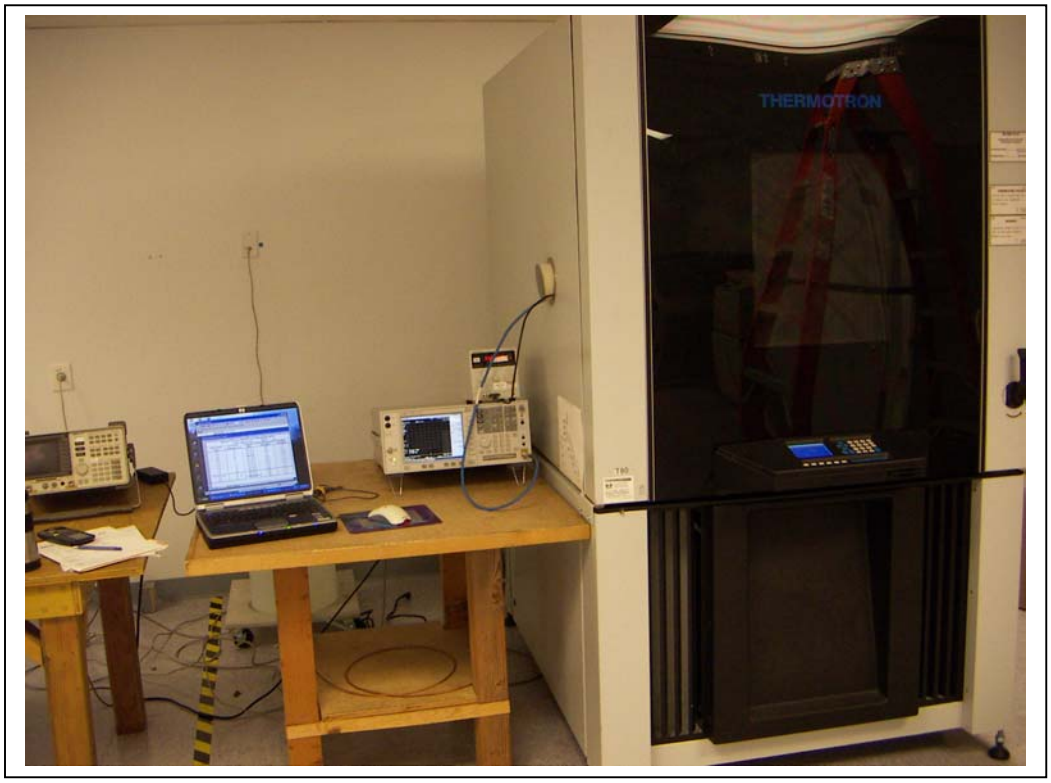
1). Setup the configuration per figure 6 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 25°C. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
2). 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 (±15%) and record the maximum frequency change.

MEASUREMENT RESULT

No non-compliance noted, as shown below.



Reference Frequency: GSM Mid Channel 1880.00000MHz @ 25°C Limit: to stay ± 2.5 ppm = 4700.017 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
4.20	50	1880.00417	1.296	± 2.5
4.20	40	1880.00587	0.391	± 2.5
4.20	30	1880.00586	0.398	± 2.5
4.20	***25***	***1880.00661***	***0***	***± 2.5***
4.20	20	1880.00496	0.876	± 2.5
4.20	10	1880.00510	0.802	± 2.5
4.20	0	1880.00764	-0.548	± 2.5
4.20	-10	1880.00520	0.749	± 2.5
4.20	-20	1880.00664	-0.019	± 2.5
4.20	-30	1880.00343	1.690	± 2.5
3.10 (end point)	25	1880.00231	2.288	± 2.5
3.57	25	1880.00342	1.695	± 2.5
4.83	25	1880.00328	1.769	± 2.5

8. APPENDICES

8.1. EXTERNAL & INTERNAL PHOTOS

8.2. SCHEMATICS

8.3. BLOCK DIAGRAM

8.4. USER MANUAL

END OF REPORT