FCC Type Approval

EMI MEASUREMENT AND TEST REPORT

For

Waxess Inc.

34 Executive Park, Suite 250
Irvine, CA 92614

FCC ID: SNBDM1000

This Report Concerns:	**Equipment Type:**
☒ Original Report	Transceiver, Dual Mode GSM850/1900 & 2.4GHz FHSS Cordless Phone

Test Engineer:	Ming Jin /
Report No.:	R0410203
Report Date:	2004-11-09
Reviewed By:	Daniel Deng /
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

Note: This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

TABLE OF CONTENTS

GENERAL INFORMATION **5**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 5
OBJECTIVE 5
RELATED SUBMITTAL(S)/GRANT(S) 5
TEST METHODOLOGY 6
TEST FACILITY 6
SYSTEM TEST CONFIGURATION **7**
JUSTIFICATION 7
BLOCK DIAGRAM 7
EQUIPMENT MODIFICATIONS 7
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 7
REMOTE SUPPORT EQUIPMENT LIST AND DETAILS 7
POWER SUPPLY INFORMATION 7
CONFIGURATION OF TEST SYSTEM 8
TEST SETUP BLOCK DIAGRAM 8
SUMMARY OF TEST RESULTS FOR FCC PART 15 ..... **9**
ANTENNA REQUIREMENT **10**
§15.207(A) - CONDUCTED EMISSION **11**
MEASUREMENT UNCERTAINTY 11
TEST SETUP 11
SPECTRUM ANALYZER SETUP 11
TEST EQUIPMENT LIST AND DETAILS 11
TEST PROCEDURE 11
ENVIRONMENTAL CONDITIONS 12
SUMMARY OF TEST RESULTS 12
CONDUCTED EMISSIONS TEST DATA 12
PLOT OF CONDUCTED EMISSIONS TEST DATA 12
§15.205 & §15.209 - RADIATED EMISSION **15**
MEASUREMENT UNCERTAINTY 15
TEST SETUP 15
SPECTRUM ANALYZER SETUP 15
TEST EQUIPMENT LIST AND DETAILS 15
ENVIRONMENTAL CONDITIONS 16
TEST PROCEDURE 16
CORRECTED AMPLITUDE & MARGIN CALCULATION 16
SUMMARY OF TEST RESULTS 16
BASE, RADIATED EMISSION TEST DATA @ 3 METER 17
HANDSET, RADIATED EMISSION TEST DATA @ 3 METER 19
§15.247 (A) (1) - HOPPING CHANNEL SEPARATION **21**
STANDARD APPLICABLE 21
MEASUREMENT PROCEDURE 21
TEST EQUIPMENT 21
ENVIRONMENTAL CONDITIONS 21
MEASUREMENT RESULTS 22
PLOTS OF HOPPING CHANNEL SEPARATION 23
§15.247 (A) (1) - CHANNEL BANDWIDTH **26**
STANDARD APPLICABLE 26
MEASUREMENT PROCEDURE 26
TEST EQUIPMENT 26
ENVIRONMENTAL CONDITIONS 26
MEASUREMENT RESULT 27
PLOT OF CHANNEL BANDWIDTH 27

§15.247 (A) (1) (III) - NUMBER OF HOPPING FREQUENCY USED 31
STANDARD APPLICABLE 31
MEASUREMENT PROCEDURE 31
TEST EQUIPMENT 31
ENVIRONMENTAL CONDITIONS 31
MEASUREMENT RESULTS 31
PLOTS OF NUMBER OF HOPPING FREQUENCY 32
§15.247 9 (A) (1) (III) - DWELL TIME 34
STANDARD APPLICABLE 34
MEASUREMENT PROCEDURE 34
TEST EQUIPMENT 34
ENVIRONMENTAL CONDITIONS 34
MEASUREMENT RESULTS 34
PLOTS OF DWELL TIME 35
§15.247 (B) (1) - MAXIMUM PEAK OUTPUT POWER 41
STANDARD APPLICABLE 41
MEASUREMENT PROCEDURE 41
TEST EQUIPMENT 41
ENVIRONMENTAL CONDITIONS 41
MEASUREMENT RESULT 41
§15.247 (B)(4) - RF EXPOSURE 42
§15.247 (C) - 100 KHZ BANDWIDTH OF BAND EDGES 44
STANDARD APPLICABLE 44
MEASUREMENT PROCEDURE 44
TEST EQUIPMENT 44
ENVIRONMENTAL CONDITIONS 44
PLOTS OF 100KHZ BANDWIDTH OF BAND EDGE 44
SPURIOUS EMISSION AT ANTENNA PORT 47
STANDARD APPLICABLE 47
MEASUREMENT PROCEDURE 47
TEST EQUIPMENT 47
ENVIRONMENTAL CONDITIONS 47
MEASUREMENT RESULTS 47
SUMMARY OF TEST RESULTS FOR FCC PART 22 & PART 24 54
§2.1093 - RF EXPOSURE 55
§2.1047 - MODULATION CHARACTERISTIC 57
APPLICABLE STANDARD 57
TEST PROCEDURE 57
TEST EQUIPMENT LIST AND DETAILS 57
ENVIRONMENTAL CONDITIONS 57
TEST RESULTS 57
§2.1053 - SPURIOUS RADIATED EMISSIONS 59
APPLICABLE STANDARD 59
TEST PROCEDURE 59
TEST EQUIPMENT LIST AND DETAILS 59
ENVIRONMENTAL CONDITIONS 59
TEST RESULT 60
§2.1046, §22.912(D), & §24.232 - RF POWER OUTPUT 61
APPLICABLE STANDARD 61
TEST PROCEDURE 61
TEST EQUIPMENT LIST AND DETAILS 62
ENVIRONMENTAL CONDITIONS 62

TEST RESULTS 62

§2.1046, §22.913(A), & §24.232 – CONDUCTED OUTPUT POWER 63

APPLICABLE STANDARD 63
TEST PROCEDURE 63
TEST EQUIPMENT LIST AND DETAILS 63
ENVIRONMENTAL CONDITIONS 63
TEST RESULTS 63

§2.1049, §22.917, §22.905, & §24.238 - OCCUPIED BANDWIDTH 67

APPLICABLE STANDARD 67
TEST PROCEDURE 67
TEST EQUIPMENT LIST AND DETAILS 67
ENVIRONMENTAL CONDITIONS 67
TEST RESULTS 67

§2.1051, §22.917, & §24.238(A) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS 70

APPLICABLE STANDARD 70
TEST PROCEDURE 70
TEST EQUIPMENT LIST AND DETAILS 70
ENVIRONMENTAL CONDITIONS 70
TEST RESULTS 70

§2.1055 (A), §2.1055 (D), §22.355, & §24.235 - FREQUENCY STABILITY 73

APPLICABLE STANDARD 73
TEST PROCEDURE 73
TEST EQUIPMENT LIST AND DETAILS 73
ENVIRONMENTAL CONDITIONS 74
TEST RESULTS 74

§22.917 & §24.238 – BAND EDGE 76

APPLICABLE STANDARD 76
TEST PROCEDURE 76
TEST EQUIPMENT LIST AND DETAILS 76
ENVIRONMENTAL CONDITIONS 76
TEST RESULTS 76

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Waxess Inc.'s* product, model no.: *DM1000G, DM100HS* or the "EUT" as referred to this report is Dual Mode GSM850/1900 & 2.4GHz FHSS Cordless Phone. The EUT is composed of two parts, Base and Handset. The base unit measures approximately 200mmL x 195mmW x 170mmH. The handset unit measures approximately 195mmL x 53mmW x 28mmH.

** The test data gathered are from typical production sample, serial number: 444, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *Waxess Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C, Part 22 Subpart H and Part 24 Subpart E of the Federal Communication Commissions rules.

It is also prepared in accordance with Part 2, Subpart J, Part 15, Subparts A and B, Part 22 Subpart H and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC 15.247 rules for the FHSS:

- Maximum Peak Output Power
- Hopping Channel Separation
- Number of Hopping Frequency Used
- 20 dB Bandwidth
- Dwell Time on Each Channel
- 100 kHz Bandwidth of Band Edge
- Conducted Emission
- Spurious Emission
- Radiated Emission
- Antenna Requirement

The objective is also to determine compliance with Part 22 Subpart H and Part 24 Subpart E rules for the GSM:

- output power
- modulation characteristic
- occupied bandwidth
- spurious emission at antenna terminal
- field strength of spurious radiation
- frequency stability
- conducted and radiated margin.
- band edge

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2001& TIA/EIA-603.

Test Facility

The Open Area Test site used by BACL Corp. to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2001& TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22:2002,Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003 & TIA/EIA-603.

The final qualification test was performed with the EUT operating at normal mode.

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Southern Telecom	Telephone	None	None	None
Teltone Corp	Simulator	TLS-3B-01	80071	None

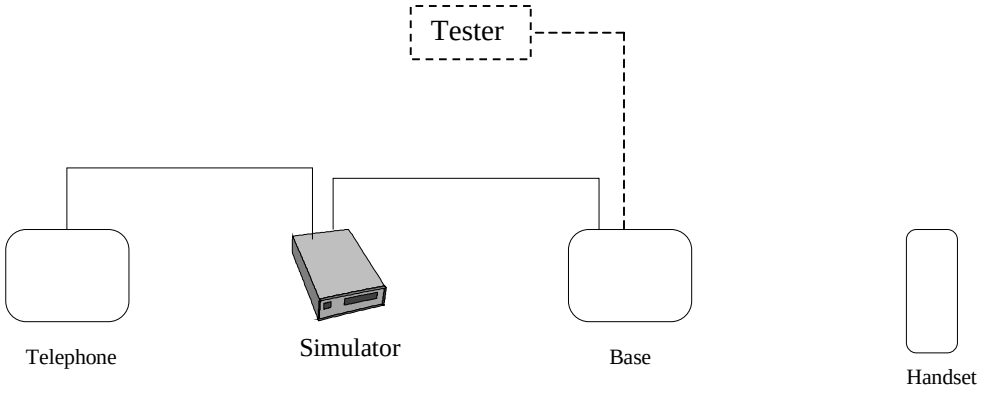
Remote Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Agilent	Wireless Communication Tester	Agilent 8960	GB44051221	None

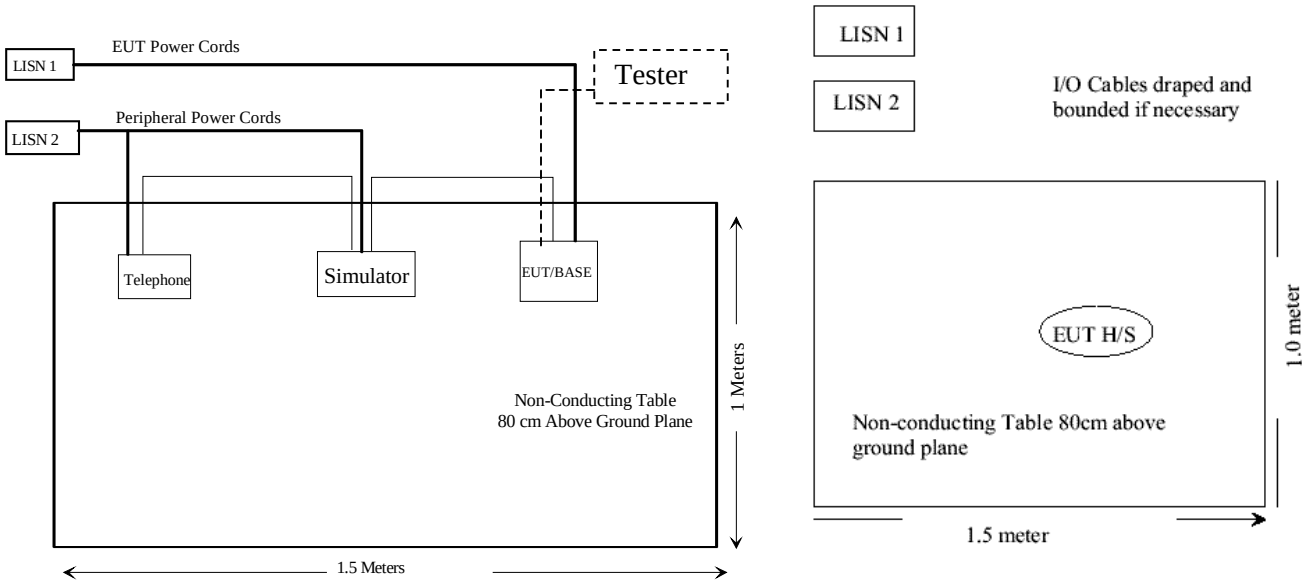
Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
Waxess	AC Adaptor	AD-48081000	None	None

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.205	Restricted Bands	N/A
§15.207 (a)	Conducted Emission	Compliant
§15.209	Radiated Emission	Within Measurement Uncertainty
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (iii)	Dwell Time of Each Frequency within a 10 Second Period of time (0.4 x Number of Channel)	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(4) § 2.1093	RF Safety Requirements	Compliant
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant
	Spurious Emission at Antenna Port	Compliant

ANTENNA REQUIREMENT

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The gain of antenna used for transmitting is 0 dBi by default, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

§15.207(a) - CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4 – 2001 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with LISN-1.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	LISN	ESH2-Z5	871884/039	2004-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15
Fluke	Calibrated Voltmeter	189	18485-38	2004-07-18

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the mains outlet of the LISN-1.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Qusi-Peak readings are distinguished with an “QP”. Average readings are distinguished with an “Ave”.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	35%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-11-09.

Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Conducted limit for a Class B device, with the *worst* margin reading of:

-7.5 dB at **12.300 MHz** in the **Neutral** conductor

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
12.300	9.7	Ave	Neutral	50	-7.5
19.100	3.8	Ave	Line	50	-9.5
0.150	41.2	Qp	Line	66	-9.7
0.150	11.9	Ave	Line	56	-10.1
0.150	29.4	Ave	Neutral	56	-12.9
0.150	48.7	Qp	Neutral	66	-13.2
12.300	15.2	Qp	Neutral	60	-15.3
19.100	7.2	Qp	Line	60	-15.8
4.670	2.8	Ave	Neutral	50	-25.0
4.930	2.0	Ave	Line	46	-25.9
4.900	2.3	Qp	Line	56	-29.8
4.660	3.0	Qp	Neutral	60	-29.8

Plot of Conducted Emissions Test Data

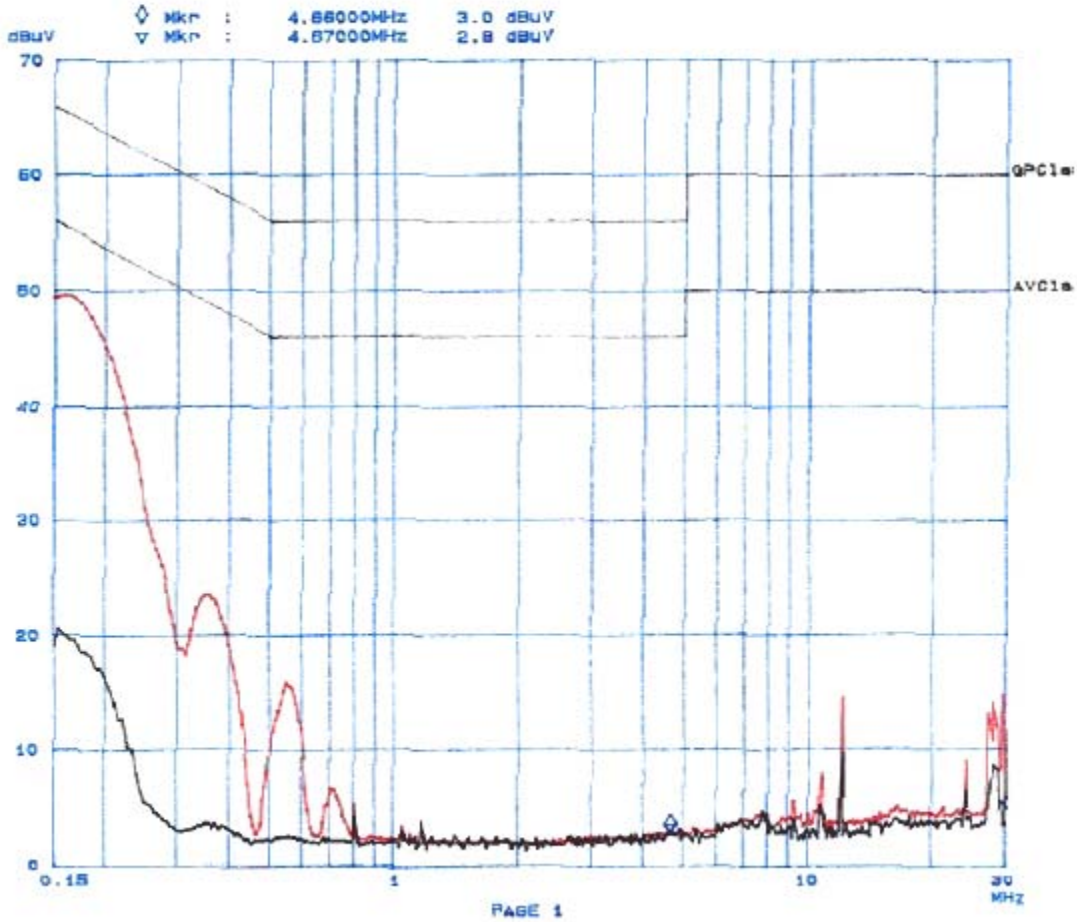
Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

Bay Area Compliance Laboratory Corp 01. Nov 04 13:03
Class B

EUT: DM1000
Manuf: WAXESS
Op Cond: Normal
Operator: Ming
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF



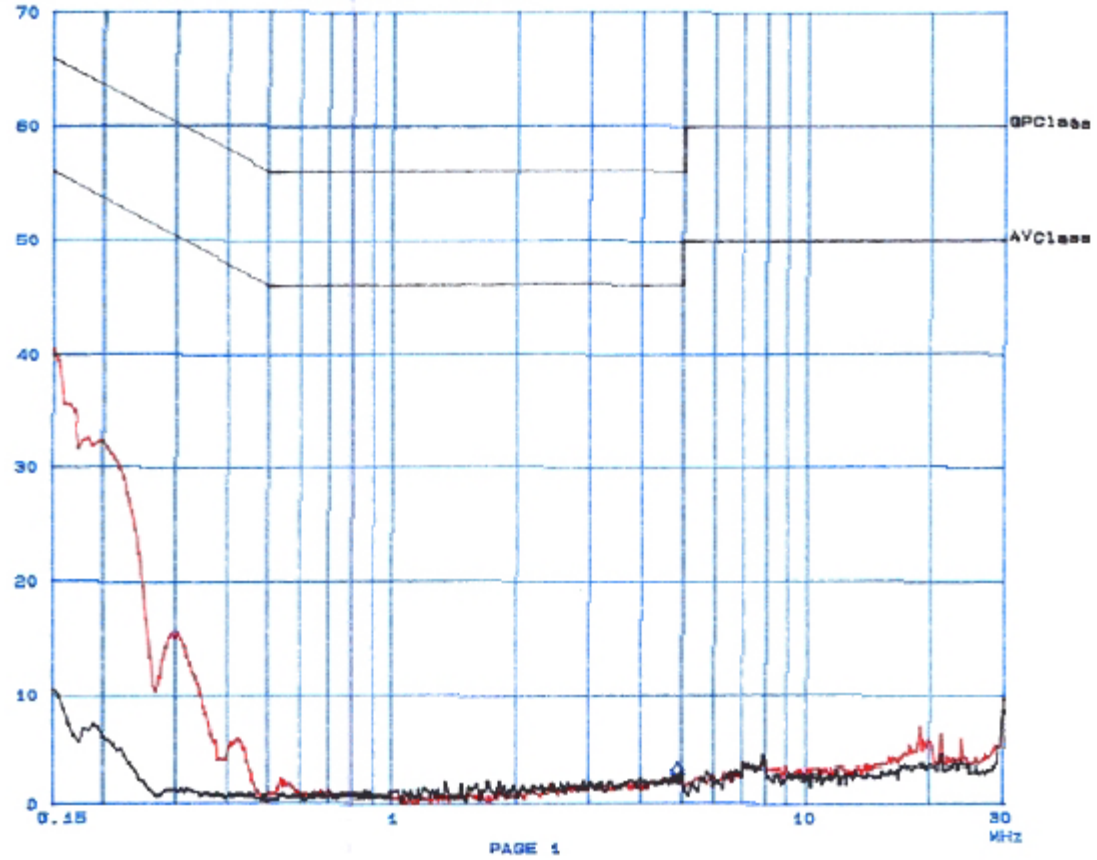
Bay Area Compliance Laboratory Corp 01. Nov 04 11:23
Class B

EUT: DM1006
Manuf: WAXESS
Op Cond: Normal
Operator: Ming
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

◊ Mkr : 4.90000MHz 2.3 dBuV
▽ Mkr : 4.93000MHz 2.0 dBuV



PAGE 1

§15.205 & §15.209 - RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

Test Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2001. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-03-14
HP	Amplifier, Pre	8447E	1937A01057	2004-08-04
HP	Analyzer, Spectrum	8565EC	3946A00131	2004-06-30
ETS	Antenna, Biconical	3110B	9603-2315	2004-01-11
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2004-09-30
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2004-08-01
ETS	Antenna, logperiodic	3148	0004-1155	2004-10-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	35%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-11-09.

Test Procedure

For the radiated emissions test, both the laptop and all peripheral power cords were connected to the AC floor outlet since the power supply used in the laptop did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**Qp**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

Summary of Test Results

According to the recorded data in following table, for base, the EUT measures within the measurement uncertainty, and had the worst margin of:

Base:

-1.1 dB at **7203.17 MHz** in the **Vertical** polarization, Low Channel.

-1.3 dB at **7324.99 MHz** in the **Vertical** polarization, Mid Channel.

-1.4 dB at **7446.81 MHz** in the **Vertical** polarization, High Channel.

According to the recorded data in following table, for Handset, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.247, and had the worst margin of:

Handset:

-5.1 dB at **7203.17 MHz** in the **Horizontal** polarization, Low Channel.

-8.6 dB at **7324.99 MHz** in the **Horizontal** polarization, Middle Channel.

-6.9 dB at **2483.50 MHz** in the **Vertical** polarization, High Channel.

-12.0 dB at **36.79 MHz** in the **Horizontal** polarization, Unintentional Emission.

Base, Radiated Emission Test Data @ 3 Meter

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2401.06	122.5	0	1.6	v	28.1	2.0	35.5	117.1			Fund/Peak
2401.06	115.2	90	1.5	h	28.1	2.0	35.5	109.8			Fund/Peak
2401.06	94.5	0	1.8	v	28.1	2.0	35.5	89.1			Fund/Ave.
2401.06	87.6	90	1.5	h	28.1	2.0	35.5	82.2			Fund/Ave.
7203.17	69.9	45	1.5	v	34.1	3.4	34.5	72.9	74	-1.1	Peak
7203.17	49.8	45	1.5	v	34.1	3.4	34.5	52.8	54	-1.2	Ave.
4802.11	51.1	0	1.6	v	32.5	3.1	34.6	52.1	54	-1.9	Ave.
4802.11	68.9	110	1.6	v	32.5	3.1	34.6	69.9	74	-4.1	Peak
7203.17	46.5	0	1.5	h	34.1	3.4	34.5	49.5	54	-4.5	Ave.
7203.17	63.7	0	1.5	h	34.1	3.4	34.5	66.7	74	-7.3	Peak
4802.11	43.9	15	1.5	h	32.5	3.1	34.6	44.9	54	-9.1	Ave.
2390.00	47.5	180	1.6	v	28.1	2.0	35.5	42.1	54	-11.9	Ave.
4802.11	60.5	15	1.5	h	32.5	3.1	34.6	61.5	74	-12.5	Peak
2390.00	41.2	180	1.5	h	28.1	2.0	35.5	35.8	54	-18.2	Ave.
2390.00	56.9	180	1.6	v	28.1	2.0	35.5	51.5	74	-22.5	Peak
2390.00	49.8	180	1.5	h	28.1	2.0	35.5	44.4	74	-29.6	Peak
Middle Channel											
2441.66	120.7	45	1.6	v	28.1	2.0	35.5	115.3			Fund/Peak
2441.66	114.5	270	1.6	h	28.1	2.0	35.5	109.1			Fund/Peak
2441.66	93.1	45	1.6	v	28.1	2.0	35.5	87.7			Fund/Ave.
2441.66	87.4	270	1.6	h	28.1	2.0	35.5	82.0			Fund/Ave.
7324.99	69.7	90	1.5	v	34.1	3.4	34.5	72.7	74	-1.3	Peak
7324.99	49.7	310	1.6	v	34.1	3.4	34.5	52.7	54	-1.3	Ave.
7324.99	63.5	45	1.8	h	34.1	3.4	34.5	66.5	74	-7.5	Peak
7324.99	43.1	45	1.8	h	34.1	3.4	34.5	46.1	54	-7.9	Ave.
4883.33	39.6	180	1.6	v	32.5	3.1	34.6	40.6	54	-13.4	Ave.
4883.33	34.5	310	1.5	h	32.5	3.1	34.6	35.5	54	-18.5	Ave.
4883.33	51.1	180	1.6	v	32.5	3.1	34.6	52.1	74	-21.9	Peak
4883.33	46.7	310	1.5	h	32.5	3.1	34.6	47.7	74	-26.3	Peak

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency MHz	Ampl. dBμV/m	Direction Degree	Height Meter	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB	Comments
High Channel											
2482.27	121.7	0	1.5	v	28.1	2.0	35.5	116.3			Fund/Peak
2482.27	111.9	15	1.5	h	28.1	2.0	35.5	106.5			Fund/Peak
2482.27	94.9	0	1.5	v	28.1	2.0	35.5	89.5			Fund/Ave.
2482.27	86.1	15	1.5	h	28.1	2.0	35.5	80.7			Fund/Ave.
7446.81	49.6	45	1.2	v	34.1	3.4	34.5	52.6	54	-1.4	Ave.
7446.81	68.6	45	1.2	v	34.1	3.4	34.5	71.6	74	-2.4	Peak
7446.81	46.3	90	1.2	h	34.1	3.4	34.5	49.3	54	-4.7	Ave.
2483.50	52.9	0	1.8	v	28.1	2.0	35.5	47.5	54	-6.5	*
2483.50	51.3	15	1.6	h	28.1	2.0	35.5	45.9	54	-8.1	*
7446.81	61.2	90	1.2	h	34.1	3.4	34.5	64.2	74	-9.8	Peak
4964.54	39.8	90	1.5	v	32.5	3.1	34.6	40.8	54	-13.2	Ave.
2483.50	65.8	0	1.8	v	28.1	2.0	35.5	60.4	74	-13.6	Peak
4964.54	34.7	45	1.2	h	32.5	3.1	34.6	35.7	54	-18.3	Ave.
2483.50	60.2	15	1.6	h	28.1	2.0	35.5	54.8	74	-19.2	Peak
4964.54	51.2	90	1.5	v	32.5	3.1	34.6	52.2	74	-21.8	Peak
4964.54	46.9	45	1.2	h	32.5	3.1	34.6	47.9	74	-26.1	Peak

*: measured under pulse and average set-up

FUND: Fundemental
AVG: Average

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Direction Degree	Height Meter	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
36.79	45.1	210	1.6	h	11.5	2.2	28.9	29.9	40	-10.1
347.15	48.5	60	1.5	v	11.8	2.2	28.4	34.1	46	-11.9
987.39	47.7	180	1.6	h	11.8	2.2	28.4	33.3	46	-12.7
420.03	41.7	290	1.5	v	11.5	2.2	28.9	26.5	46	-19.5

Handset, Radiated Emission Test Data @ 3 Meter

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2401.06	113.9	290	1.8	v	28.1	2.0	35.5	108.5			Fund/Peak
2401.06	106.4	330	1.5	h	28.1	2.0	35.5	101.0			Fund/Peak
2401.06	84.8	290	1.8	v	28.1	2.0	35.5	79.4			Fund/Ave.
2401.06	78.9	330	1.5	h	28.1	2.0	35.5	73.5			Fund/Ave.
7203.17	45.9	0	1.5	h	34.1	3.4	34.5	48.9	54	-5.1	Ave.
7203.17	43.7	45	1.5	v	34.1	3.4	34.5	46.7	54	-7.3	Ave.
4802.11	44.7	15	1.5	h	32.5	3.1	34.6	45.7	54	-8.3	Ave.
7203.17	61.1	0	1.5	h	34.1	3.4	34.5	64.1	74	-9.9	Peak
4802.11	42.4	0	1.6	v	32.5	3.1	34.6	43.4	54	-10.6	Ave.
7203.17	59.2	45	1.5	v	34.1	3.4	34.5	62.2	74	-11.8	Peak
4802.11	57.8	15	1.5	h	32.5	3.1	34.6	58.8	74	-15.2	Peak
4802.11	55.3	0	1.6	v	32.5	3.1	34.6	56.3	74	-17.7	Peak
2390.00	39.2	290	1.8	h	28.1	2.0	35.5	33.8	54	-20.2	Ave.
2390.00	38.7	15	1.6	v	28.1	2.0	35.5	33.3	54	-20.7	Ave.
2390.00	47.6	290	1.8	h	28.1	2.0	35.5	42.2	74	-31.8	Peak
2390.00	47.2	15	1.6	v	28.1	2.0	35.5	41.8	74	-32.2	Peak
Middle Channel											
2441.66	111.3	330	1.6	v	28.1	2.0	35.5	105.9			Fund/Peak
2441.66	106.7	0	1.5	h	28.1	2.0	35.5	101.3			Fund/Peak
2441.66	84.2	330	1.6	v	28.1	2.0	35.5	78.8			Fund/Ave.
2441.66	80.3	0	1.5	h	28.1	2.0	35.5	74.9			Fund/Ave.
7324.99	42.4	45	1.8	h	34.1	3.4	34.5	45.4	54	-8.6	Ave.
7324.99	41.1	310	1.6	v	34.1	3.4	34.5	44.1	54	-9.9	Ave.
4883.33	40.5	0	1.6	h	32.5	3.1	34.6	41.5	54	-12.5	Ave.
4883.33	39.4	310	1.6	v	32.5	3.1	34.6	40.4	54	-13.6	Ave.
7324.99	55.7	45	1.8	h	34.1	3.4	34.5	58.7	74	-15.3	Peak
7324.99	54.1	310	1.6	v	34.1	3.4	34.5	57.1	74	-16.9	Peak
4883.33	52.3	0	1.6	h	32.5	3.1	34.6	53.3	74	-20.7	Peak
4883.33	51.1	310	1.6	v	32.5	3.1	34.6	52.1	74	-21.9	Peak

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency MHz	Ampl. dBμV/m	Direction Degree	Height Meter	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB	Comments
High Channel											
2482.27	113.8	0	1.8	v	28.1	2.0	35.5	108.4			Fund/Peak
2482.27	107.1	15	1.5	h	28.1	2.0	35.5	101.7			Fund/Peak
2482.27	86.7	0	1.8	v	28.1	2.0	35.5	81.3			Fund/Ave.
2482.27	80.6	15	1.5	h	28.1	2.0	35.5	75.2			Fund/Ave.
2483.50	52.5	0	1.8	v	28.1	2.0	35.5	47.1	54	-6.9	*
7446.81	43.5	90	1.2	h	34.1	3.4	34.5	46.5	54	-7.5	Ave.
2483.50	51.7	15	1.6	h	28.1	2.0	35.5	46.3	54	-7.7	Note
7446.81	43.1	45	1.2	v	34.1	3.4	34.5	46.1	54	-7.9	Ave.
4964.54	42.8	270	1.6	h	32.5	3.1	34.6	43.8	54	-10.2	Ave.
2483.50	68.2	0	1.8	v	28.1	2.0	35.5	62.8	74	-11.2	Peak
4964.54	40.1	45	1.5	v	32.5	3.1	34.6	41.1	54	-12.9	Ave.
7446.81	56.9	90	1.2	h	34.1	3.4	34.5	59.9	74	-14.1	Peak
7446.81	56.7	45	1.2	v	34.1	3.4	34.5	59.7	74	-14.3	Peak
2483.50	61.9	15	1.6	h	28.1	2.0	35.5	56.5	74	-17.5	Peak
4964.54	55.2	270	1.6	h	32.5	3.1	34.6	56.2	74	-17.8	Peak
4964.54	51.4	45	1.5	v	32.5	3.1	34.6	52.4	74	-21.6	Peak

*: measured under pulse and average set-up

FUND: Fundemental
AVG: Average

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Direction Degree	Height Meter	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
36.79	43.2	270	1.5	h	11.5	2.2	28.9	28.0	40	-12.0
987.39	47.3	330	1.8	h	11.8	2.2	28.4	32.9	46	-13.1
73.20	39.7	60	1.2	v	11.8	2.2	28.8	24.9	40	-15.1

§15.247 (a) (1) - HOPPING CHANNEL SEPARATION

Standard Applicable

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Description	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

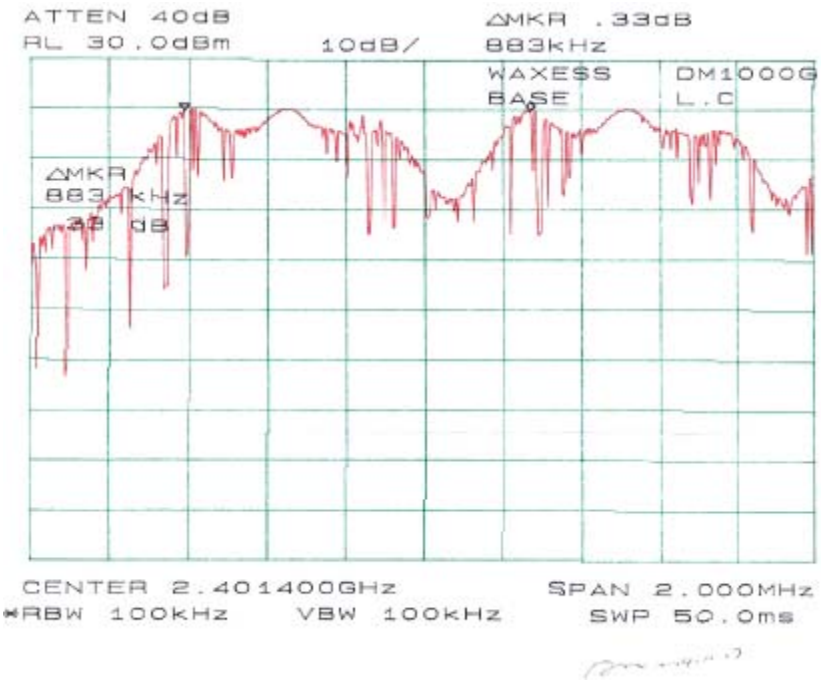
The testing was performed by Ming Jin on 2004-10-27.

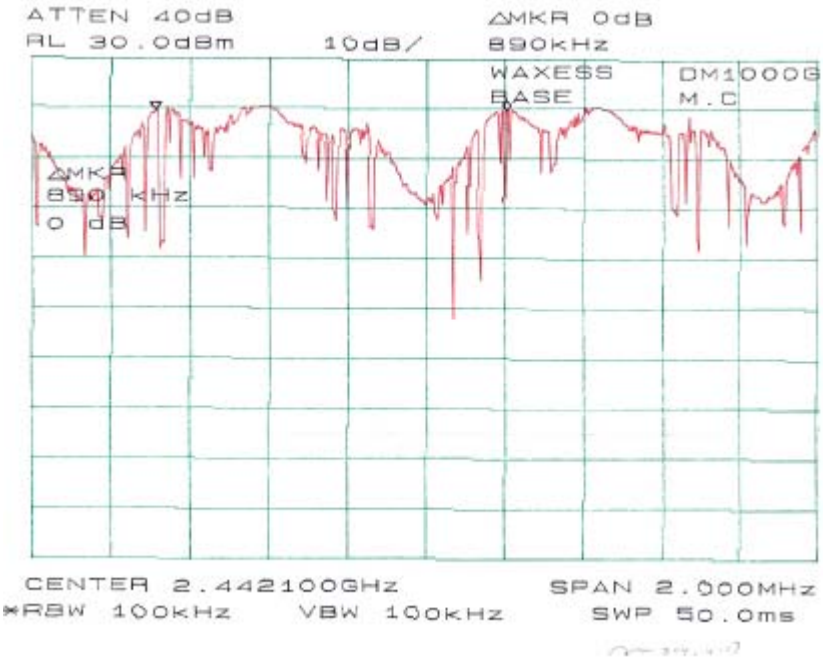
Measurement Results

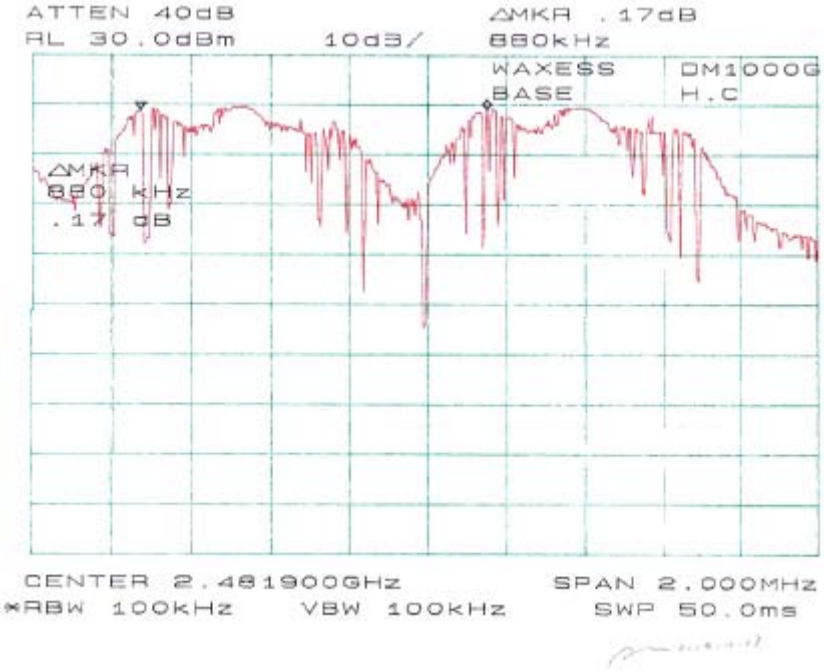
Unit	Channel	Measurement (KHz)	Result
Base	Low	883	Compliant
	Middle	890	Compliant
	High	880	Compliant
Handset	Low	893	Compliant
	Middle	890	Compliant
	High	883	Compliant

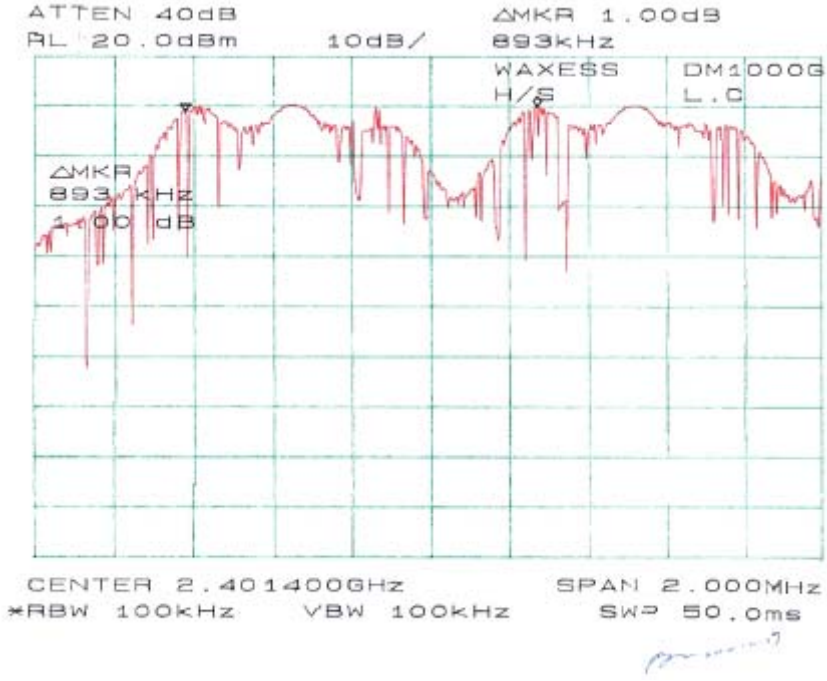
Plots of Hopping Channel Separation

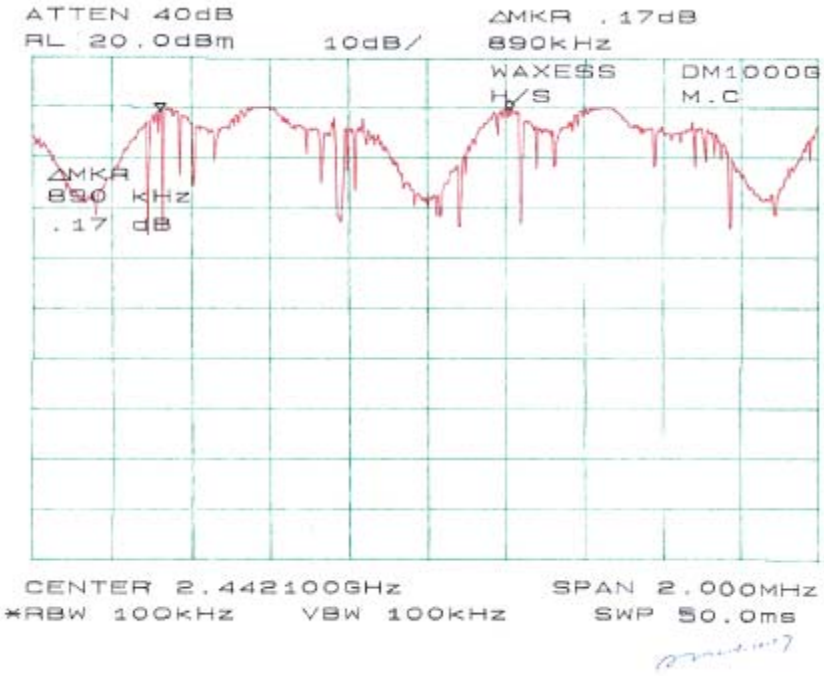
Please refer to the following plots.

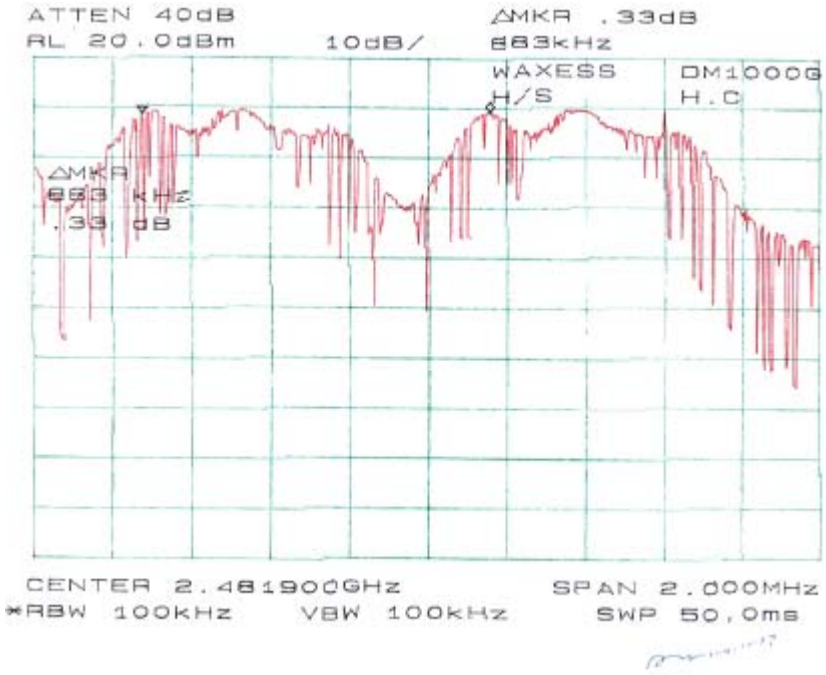





ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .17dB
880kHz
WAXESS
BASE
DM1000G
H.C
ΔMKR
880 kHz
.17 dB
CENTER 2.481900GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 20.0dBm
10dB/
ΔMKR 1.00dB
893kHz
WAXESS
H/S
DM1000G
L.C
ΔMKR
893 kHz
1.00 dB
CENTER 2.401400GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 20.0dBm
10dB/
ΔMKR .17dB
890kHz
WAXESS
H/S
DM1000G
M.C
ΔMKR
890 kHz
.17 dB
CENTER 2.442100GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 20.0dBm
10dB/
ΔMKR .33dB
883kHz
WAXESS
H/S
DM1000G
H.C
ΔMKR
883 kHz
.33 dB
CENTER 2.481900GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

According to §15.247(a)(l), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

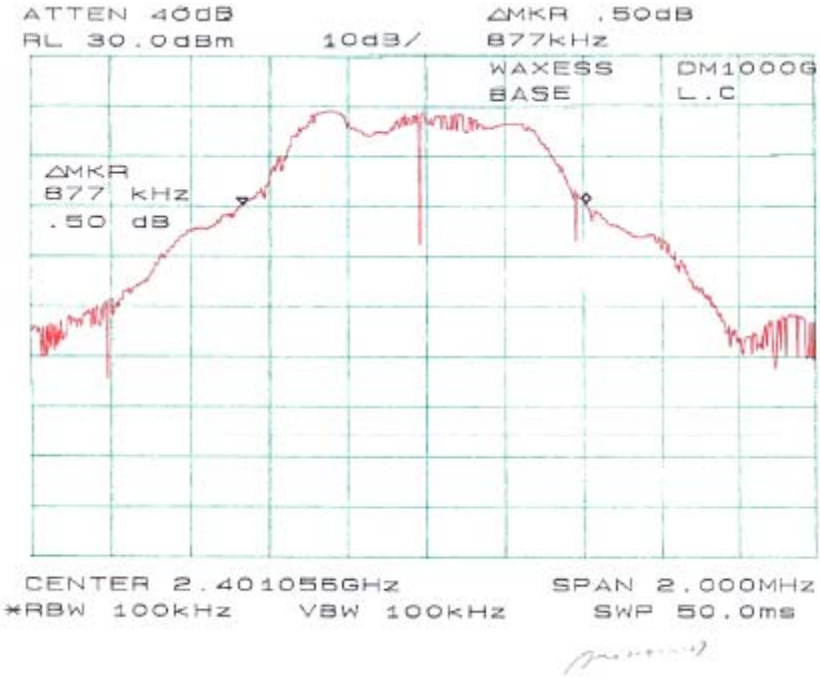
The testing was performed by Ming Jin on 2004-10-27.

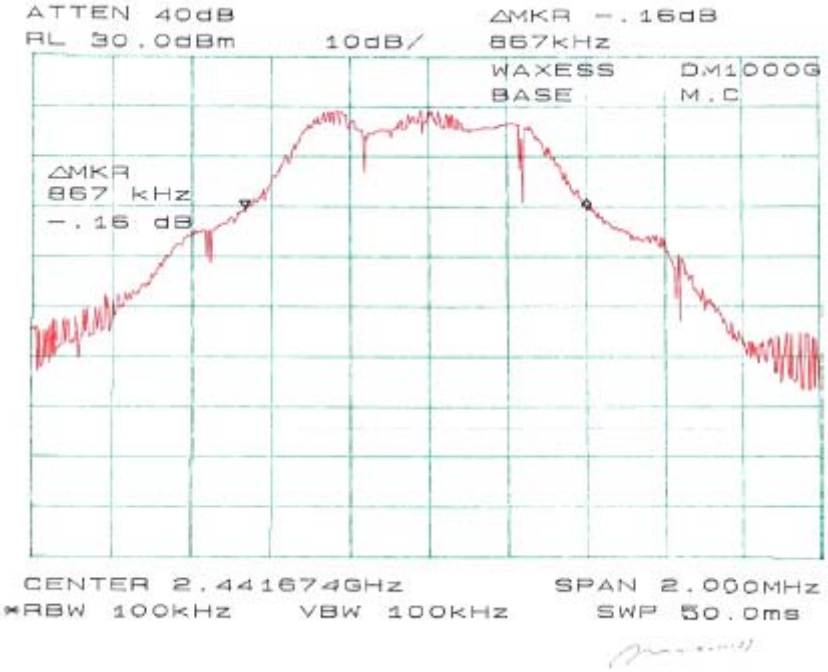
Measurement Result

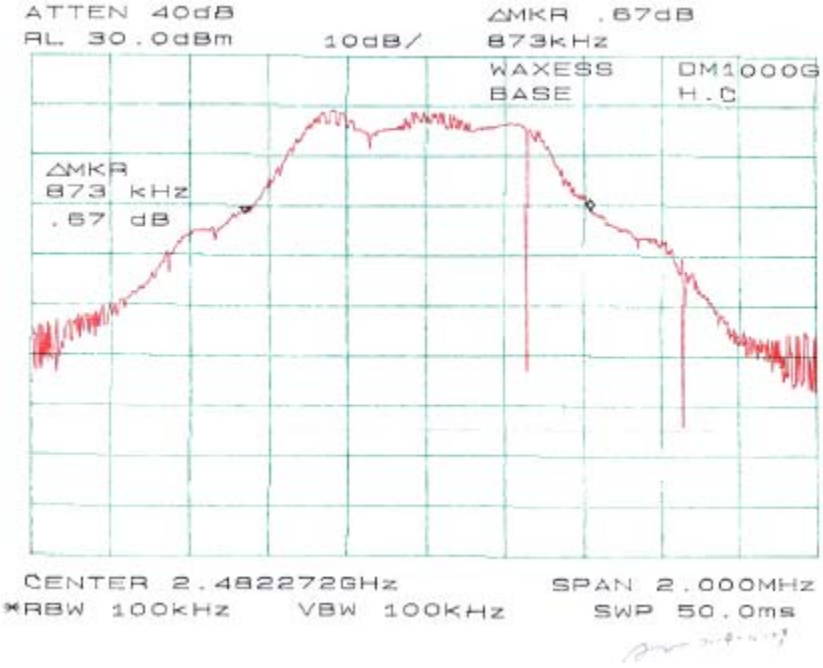
Unit	Frequency	Measurement (kHz)	Standard	Result
Base	Low	877	≤ 1MHz	Compliant
	Middle	867	≤ 1MHz	Compliant
	High	873	≤ 1MHz	Compliant
Handset	Low	873	≤ 1MHz	Compliant
	Middle	867	≤ 1MHz	Compliant
	High	877	≤ 1MHz	Compliant

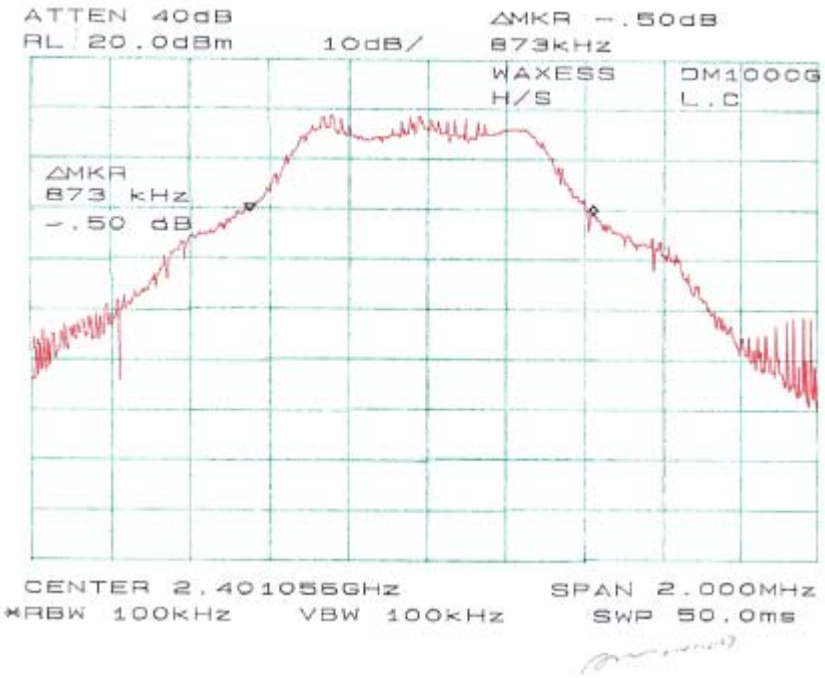
Plot of Channel Bandwidth

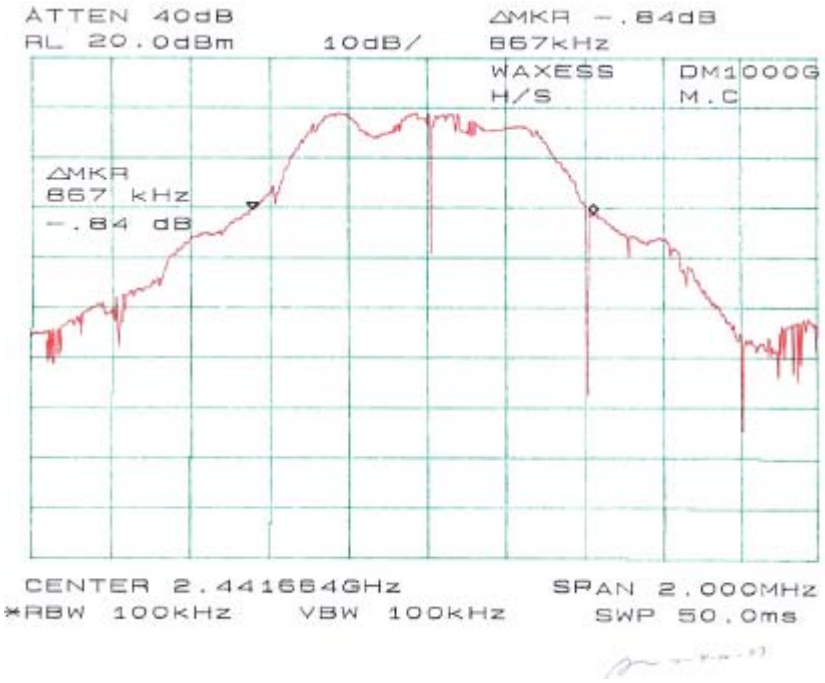
Please see the following plots

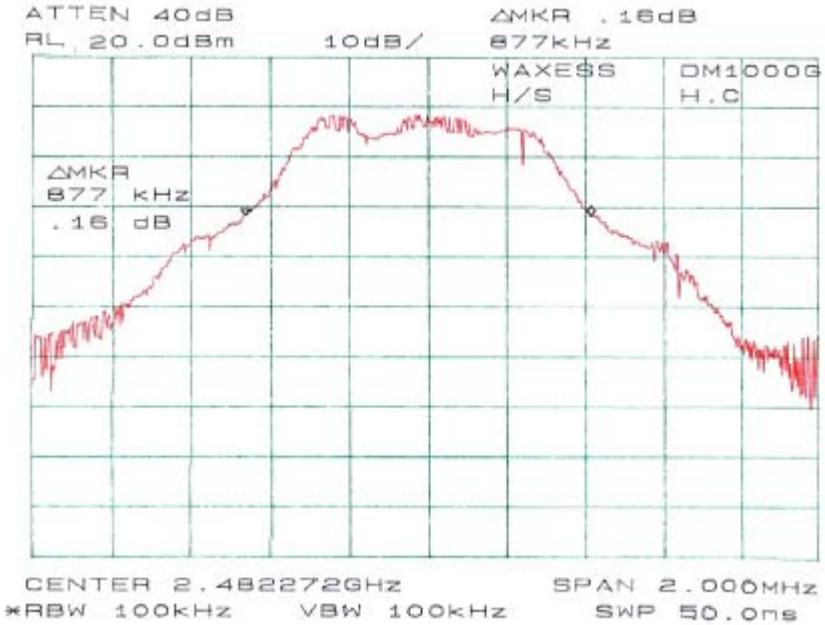



ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.16dB
867kHz
WAXESS
BASE
DM1000G
M.C
ΔMKR
867 kHz
-.16 dB
CENTER 2.441674GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .67dB
873kHz
WAXESS
BASE
DM1000G
H.C
ΔMKR
873 kHz
.67 dB
CENTER 2.482272GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 20.0dBm
10dB/
ΔMKR -.50dB
873kHz
WAXESS
H/S
DM1000G
L.C
ΔMKR
873 kHz
-.50 dB
CENTER 2.401056GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 20.0dBm
10dB/
ΔMKR -.84dB
867kHz
WAXESS
H/S
DM1000G
M.C
ΔMKR
867 kHz
-.84 dB
CENTER 2.441664GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 20.0dBm
10dB/
ΔMKR .16dB
877kHz
WAXESS
H/S
DM1000G
H.C
ΔMKR
877 kHz
.16 dB
CENTER 2.482272GHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

§15.247 (a) (1) (iii) - NUMBER OF HOPPING FREQUENCY USED

Standard Applicable

According to §15.247(a)(1)(iii), frequency hopping systems operating in the 2400-2483.5Mhz band shall use at least 75 hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

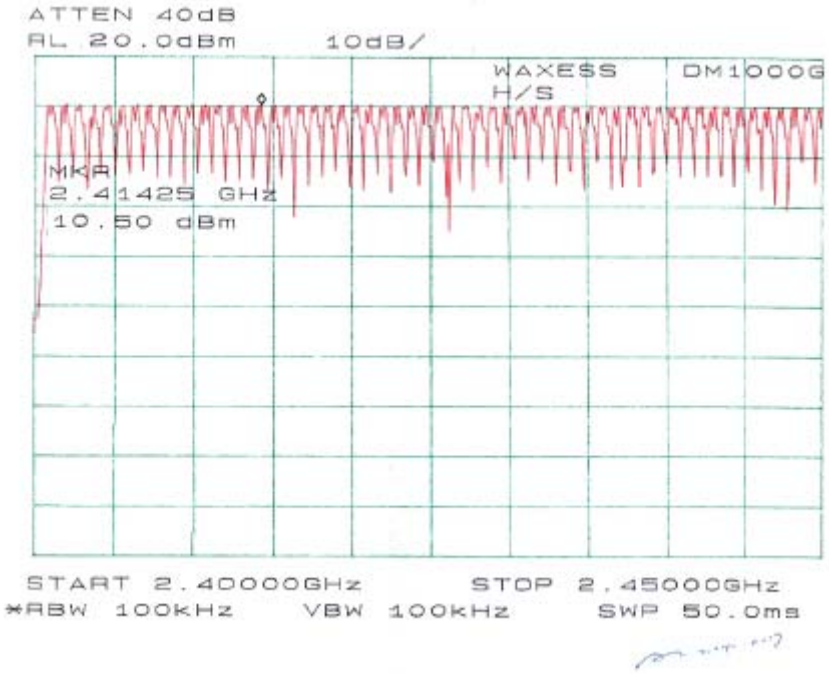
The testing was performed by Ming Jin on 2004-10-27.

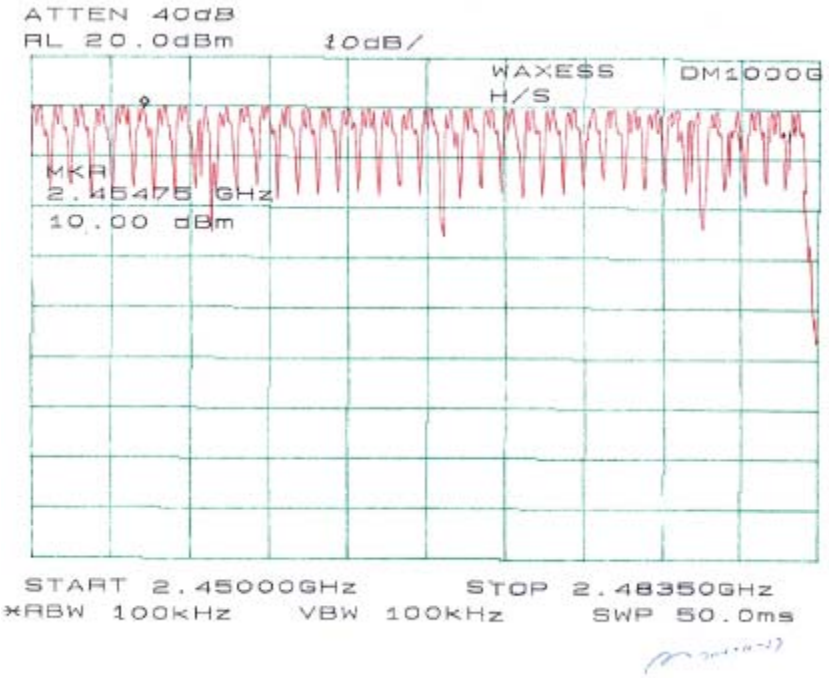
Measurement Results

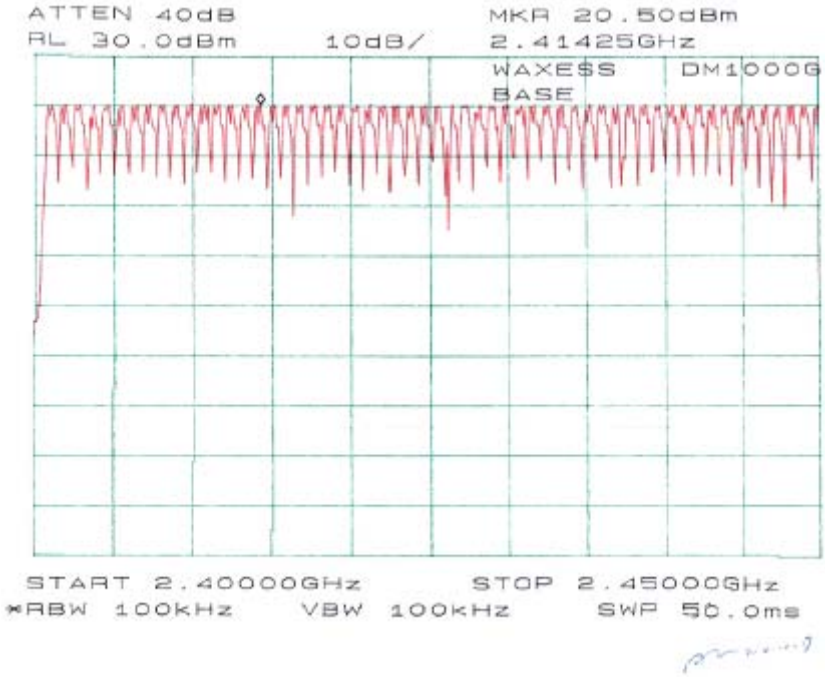
UNIT	Measurement	Standard	Result
Base	95	75	Compliant
Handset	95	75	Compliant

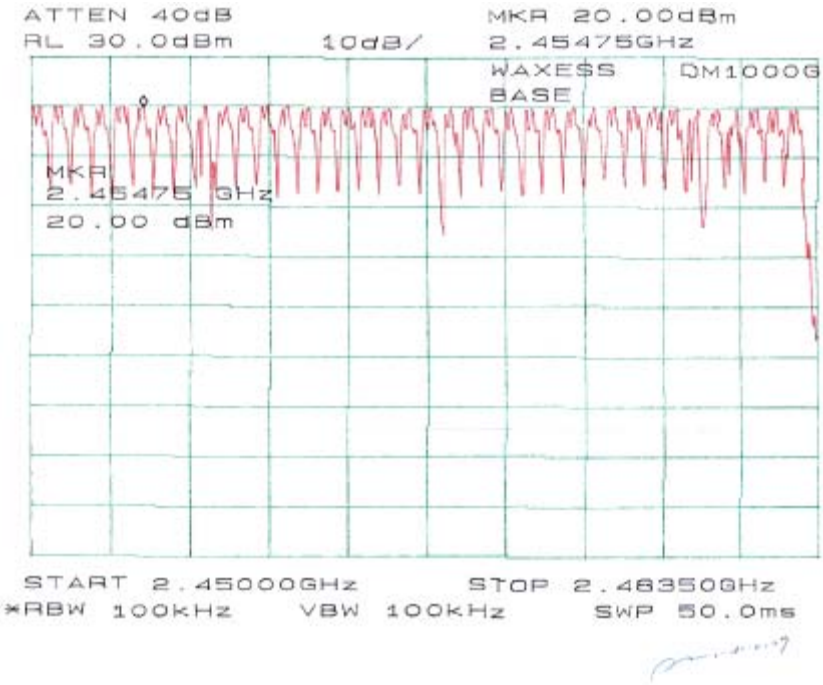
Plots of Number of Hopping Frequency

Please refer to the following plots.






ATTEN 40dB
RL 30.0dBm
10dB/
MKR 20.50dBm
2.41425GHz
WAXESS
DM1000G
BASE
START 2.40000GHz
STOP 2.45000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 20.00dBm
2.45475GHz
WAXESS
DM1000G
BASE
MKR
2.45475 GHz
20.00 dBm
START 2.45000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

§15.247 9 (a) (1) (iii) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(iii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-10-27.

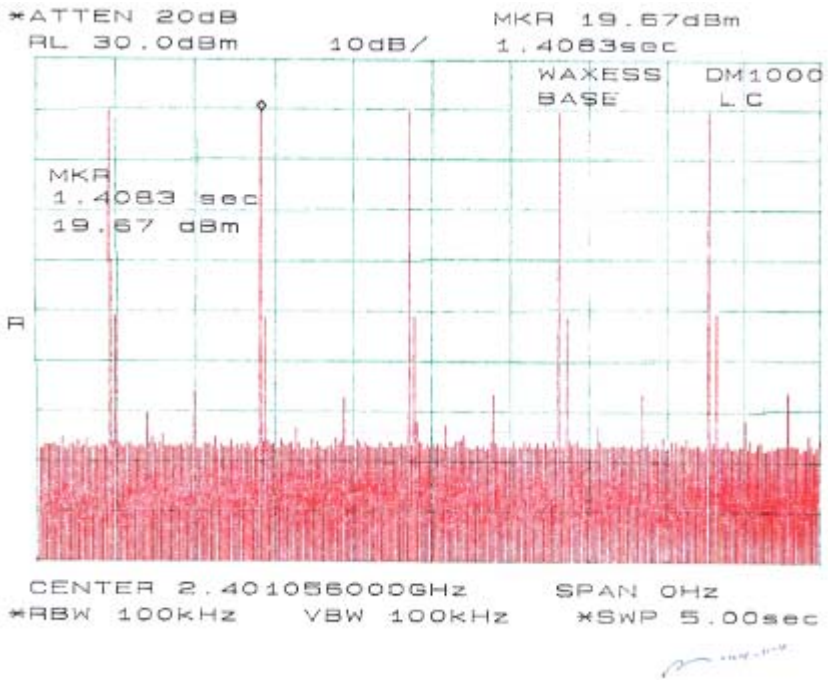
Measurement Results

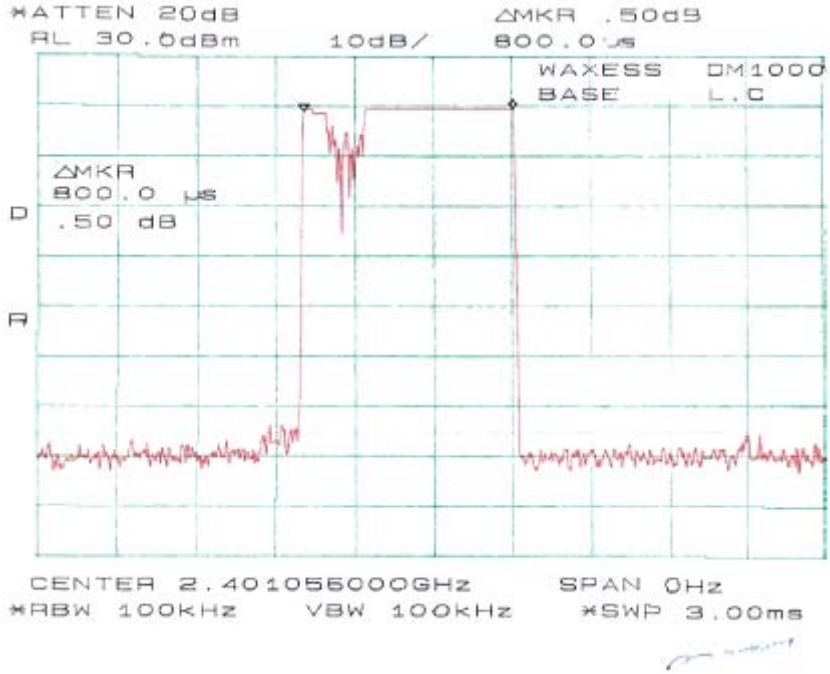
Base:
Low Channel: 5 x 0.800(ms) x [(95x0.4) / 5 (s)] = 0.0304 s < 0.4 s
Middle Channel: 5 x 0.810(ms) x [(95x0.4) / 5 (s)] = 0.0308 s < 0.4 s
High Channel: 5 x 0.810(ms) x [(95x0.4) / 5 (s)] = 0.0308 s < 0.4 s

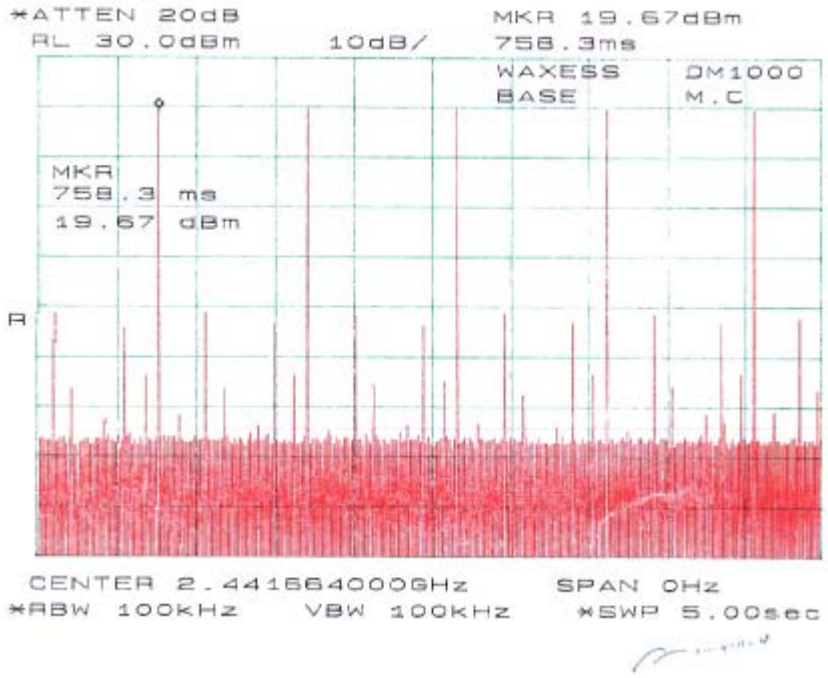
Handset:
Low Channel: 5 x 0.805(ms) x [(95x0.4) / 5 (s)] = 0.0306 s < 0.4 s
Middle Channel: 5 x 0.800(ms) x [(95x0.4) / 5 (s)] = 0.0304 s < 0.4 s
High Channel: 5 x 0.805(ms) x [(95x0.4) / 5 (s)] = 0.0306 s < 0.4 s

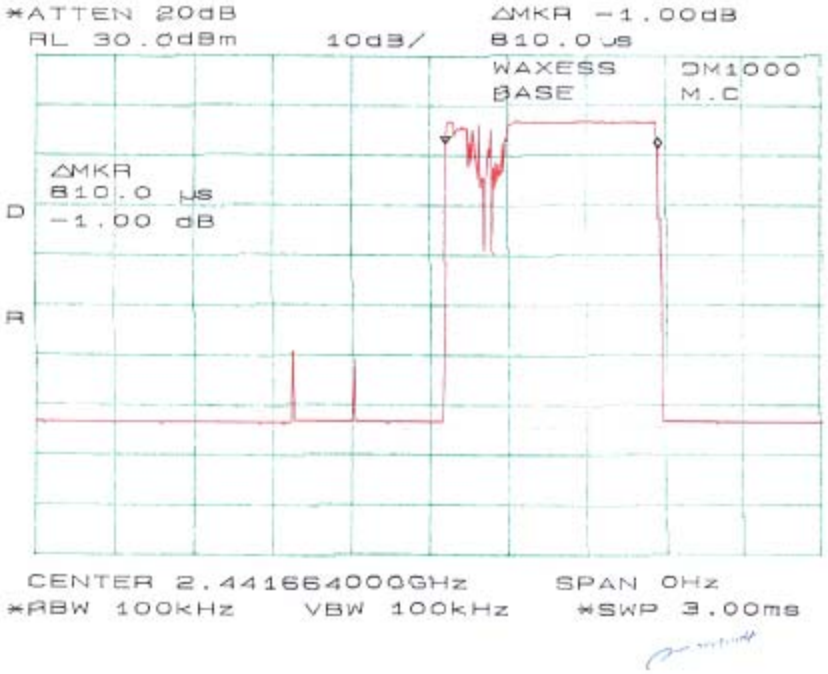
Plots of Dwell Time

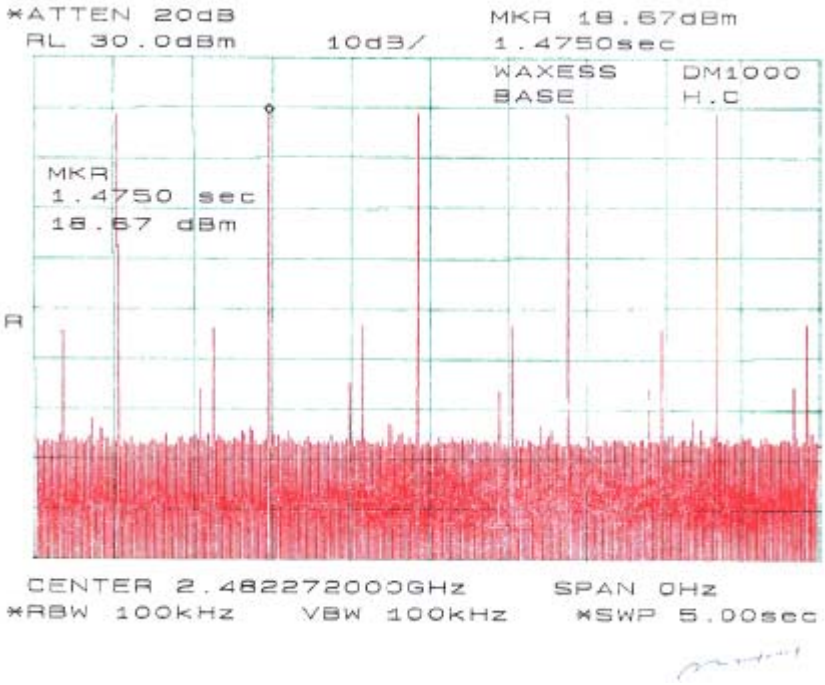
Please refer the following plots.

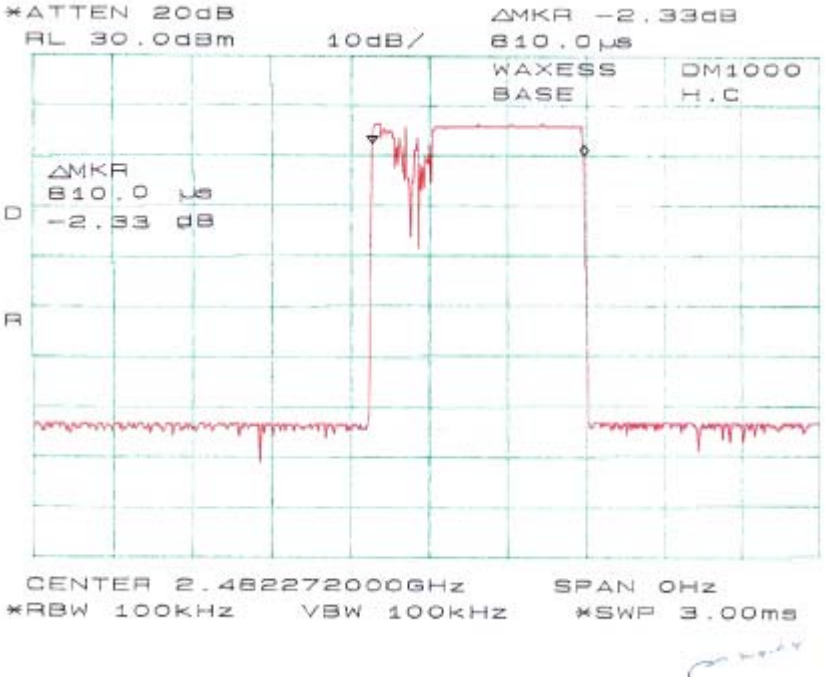


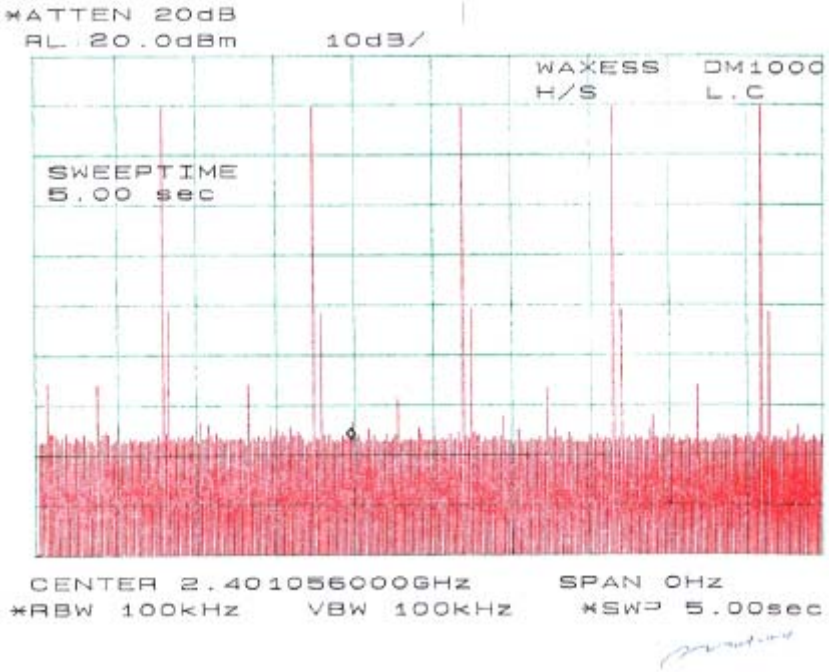


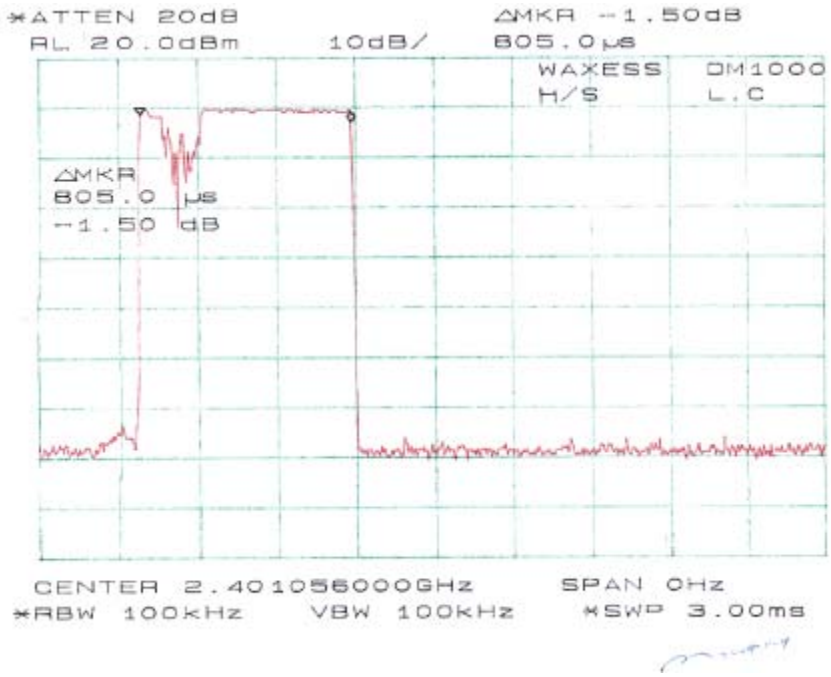

*ATTEN 20dB
RL 30.0dBm
10dB/
MKR 19.67dBm
758.3ms
WAXESS
BASE
DM1000
M.C
MKR
758.3 ms
19.67 dBm
R
CENTER 2.441664000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec

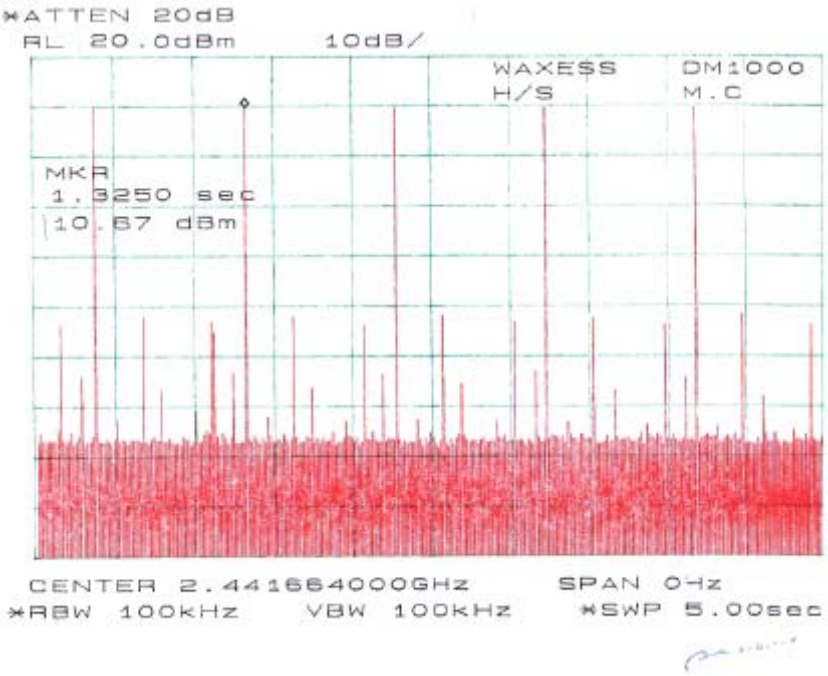

*ATTEN 20dB
RL 30.0dBm
10dB/
ΔMKR -1.00dB
810.0 µs
WAXESS
BASE
DM1000
M.C
ΔMKR
810.0 µs
-1.00 dB
D
R
CENTER 2.441664000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 3.00ms

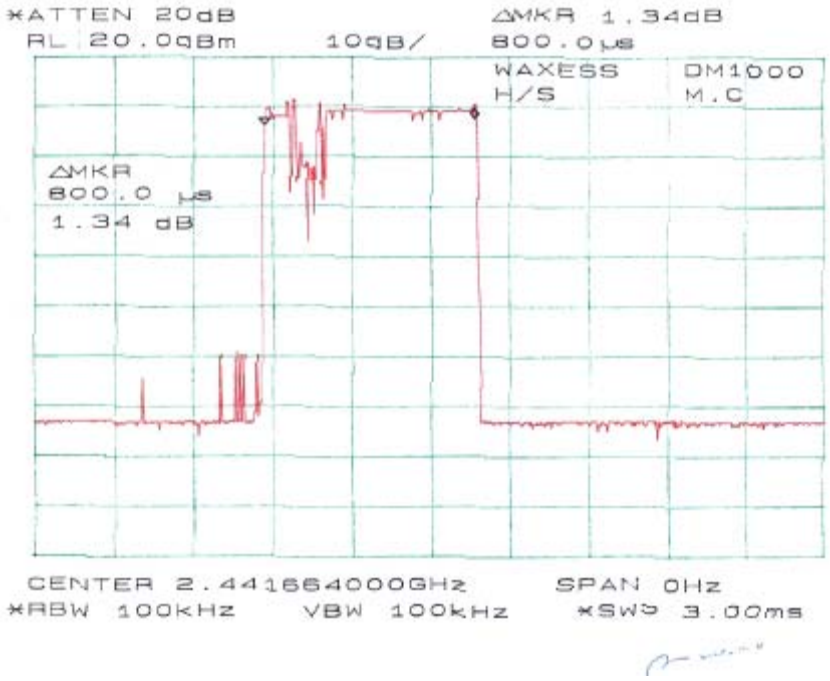

*ATTEN 20dB
RL 30.0dBm
10dB/
MKR 18.67dBm
1.4750sec
WAXESS
BASE
DM1000
H.C
MKR
1.4750 sec
18.67 dBm
R
CENTER 2.482272000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec

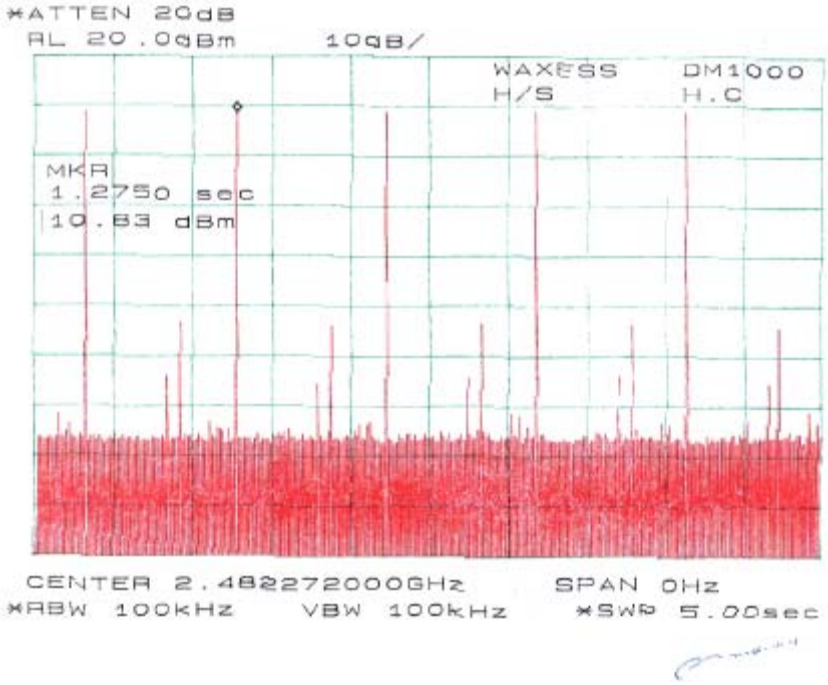

*ATTEN 20dB
RL 30.0dBm
10dB/
ΔMKR -2.33dB
810.0μs
WAXESS
BASE
DM1000
H.C
ΔMKR
810.0 μs
-2.33 dB
D
R
CENTER 2.482272000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 3.00ms

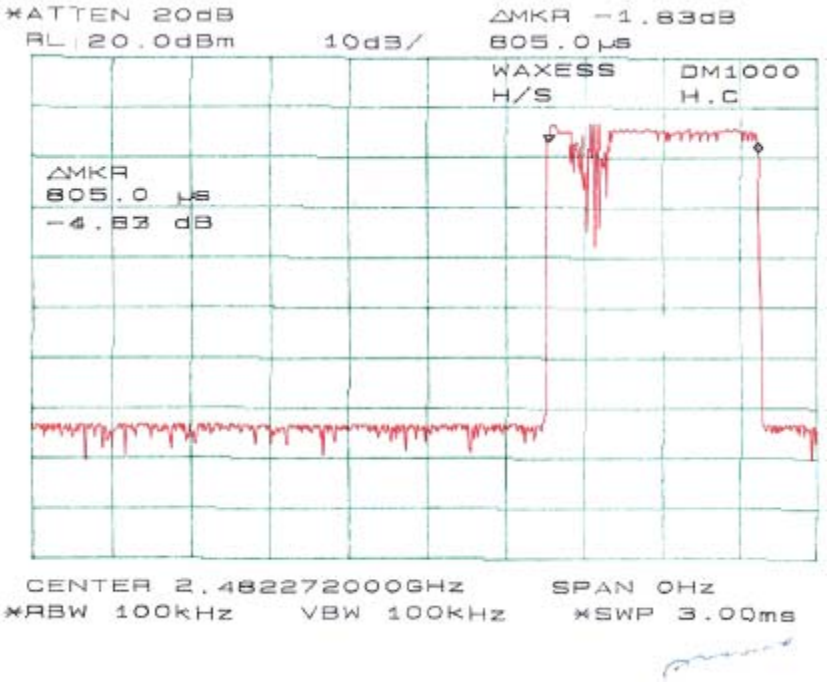

*ATTEN 20dB
RL 20.0dBm
10dB/
WAXESS
H/S
DM1000
L.C
SWEEPTIME
5.00 sec
CENTER 2.401056000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec


*ATTEN 20dB
RL 20.0dBm
10dB/
ΔMKR -1.50dB
805.0μs
WAXESS
H/S
DM1000
L.C
ΔMKR
805.0 μs
-1.50 dB
CENTER 2.401056000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 3.00ms


*ATTEN 20dB
RL 20.0dBm
10dB/
WAXESS
H/S
DM1000
M.C
MKR
1.3250 sec
10.67 dBm
CENTER 2.441664000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec


*ATTEN 20dB
RL 20.0dBm
10dB/
ΔMKR 1.34dB
800.0μs
WAXESS
H/S
DM1000
M.C
ΔMKR
800.0 μs
1.34 dB
CENTER 2.441664000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 3.00ms


*ATTEN 20dB
RL 20.0dBm
10dB/
WAXESS
H/S
DM1000
H.C
MKR
1.2750 sec
10.83 dBm
CENTER 2.482272000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec


*ATTEN 20dB
RL 20.0dBm
10dB/
ΔMKR -1.83dB
805.0μs
WAXESS
H/S
DM1000
H.C
ΔMKR
805.0 μs
-4.83 dB
CENTER 2.482272000GHz
SPAN 0Hz
*RBW 100kHz
VBW 100kHz
*SWP 3.00ms

§15.247 (b) (1) - MAXIMUM PEAK OUTPUT POWER

Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt.

Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-10-27.

Measurement Result

Unit	Channel	Frequency	Output Power in dBm	Output Power in mW	Standard	Result
Base	Low	2401.056	22.8	190.5	≤ 1W	Compliant
	Middle	2441.664	23.1	204.2	≤ 1W	Compliant
	High	2482.272	22.5	177.8	≤ 1W	Compliant
Handset	Low	2401.056	16.1	40.7	≤ 1W	Compliant
	Middle	2441.664	16.3	41.7	≤ 1W	Compliant
	High	2482.272	15.9	38.9	≤ 1W	Compliant

§15.247 (b)(4) - RF EXPOSURE

According to §15.247(b)(4) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Base:
Maximum peak output power at antenna input terminal: 23.1 (dBm)
Maximum peak output power at antenna input terminal: 204.2 (mW)
Prediction distance: 20 (cm)
Predication frequency: 2400 (MHz)
Antenna Gain (typical): 0 (dBi)
Maximum antenna gain: 1(numeric)
Power density at predication frequency at 20 cm: 0.04(mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm^2)

Handset:
Maximum peak output power at antenna input terminal: 16.3 (dBm)
Maximum peak output power at antenna input terminal: 41.7 (mW)
Prediction distance: 2.5 (cm)
Predication frequency: 2400 (MHz)
Antenna Gain (typical): 0 (dBi)
Maximum antenna gain: 1(numeric)
Power density at predication frequency at 2.5 cm: 0.53 (mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm^2)

Test Result

Base Unit: The predicted power density level at 20 cm is 0.04 mW/cm^2. This is below the uncontrolled exposure limit of 1mW/cm^2 at 2400 MHz. The EUT is used at least 20cm away from user's body. It is determined as mobile equipment.

Handset Unit: The predicted power density level at 2.5 cm is 0.53 mW/cm^2. This is below the uncontrolled exposure limit of 1mW/cm^2 at 2400 MHz. The EUT is used at least 2.5cm away from user's body. It is determined as portable equipment.

§15.247 (c) - 100 KHZ BANDWIDTH OF BAND EDGES

Standard Applicable

According to §15.247(c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

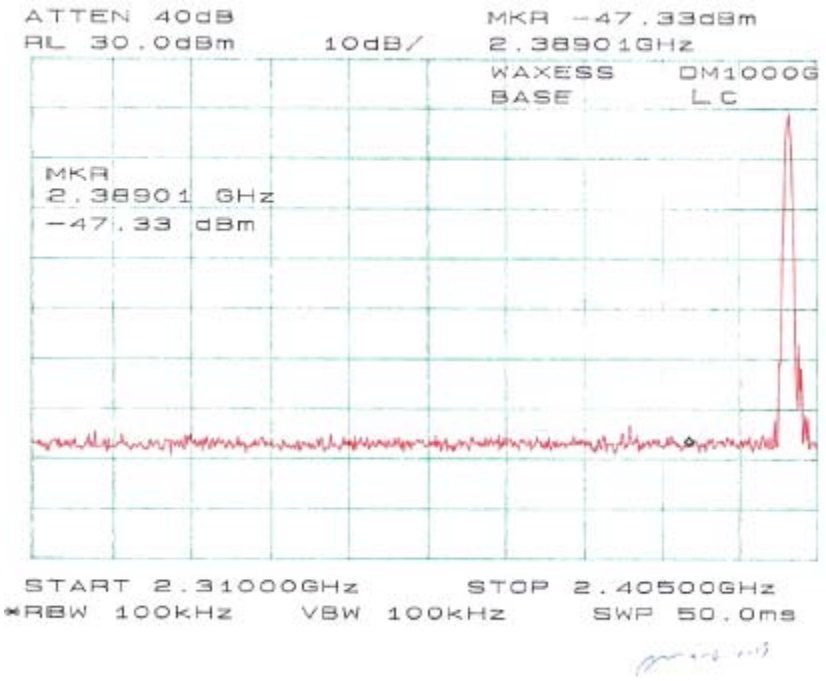
Environmental Conditions

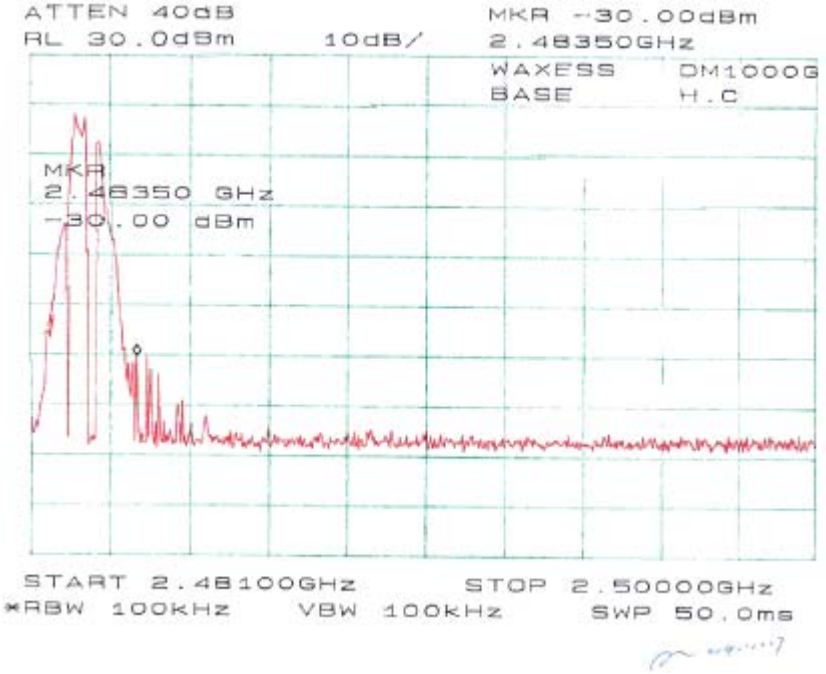
Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

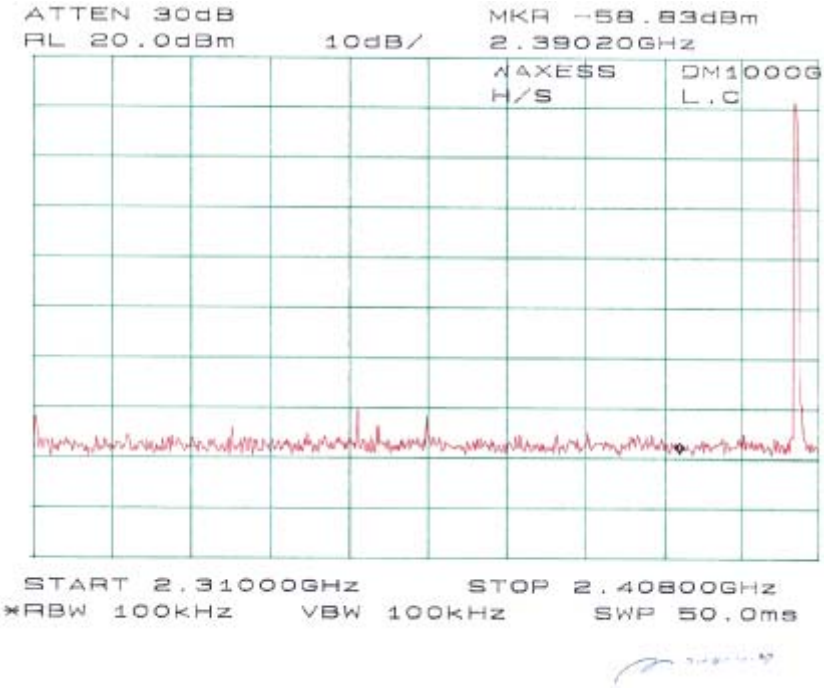
The testing was performed by Ming Jin on 2004-10-27.

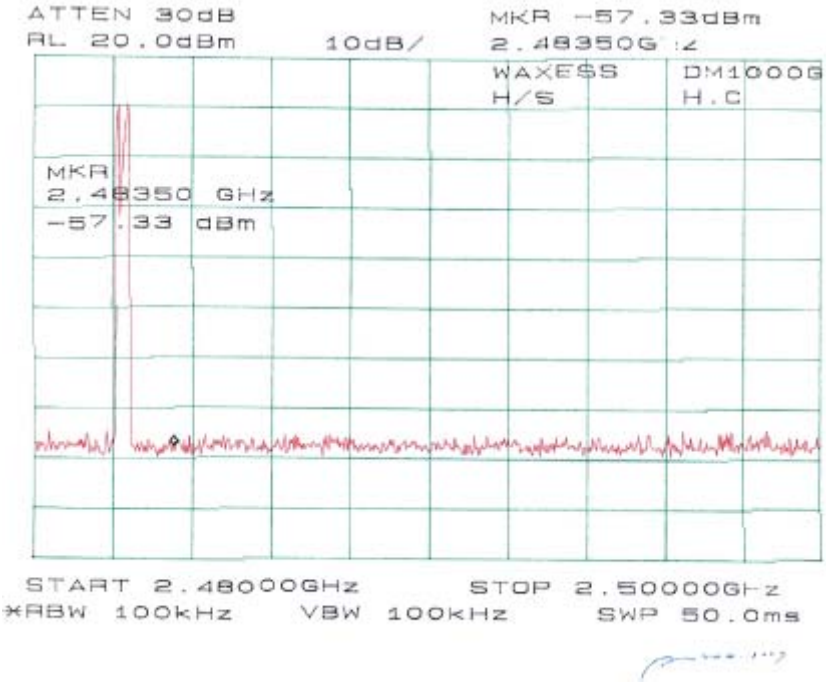
Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.


ATTEN 40dB
RL 30.0dBm 10dB/
MKR -47.33dBm
2.38901GHz
WAXESS DM1000G
BASE L.C
MKR
2.38901 GHz
-47.33 dBm
START 2.31000GHz STOP 2.40500GHz
*RBW 100kHz VBW 100kHz SWP 50.0ms


ATTEN 40dB
RL 30.0dBm 10dB/
MKR -30.00dBm
2.48350GHz
WAXESS DM1000G
BASE H.C
MKR
2.48350 GHz
-30.00 dBm
START 2.48100GHz STOP 2.50000GHz
*RBW 100kHz VBW 100kHz SWP 50.0ms


ATTEN 30dB
RL 20.0dBm
10dB/
MKR -58.83dBm
2.39020GHz
WAXESS
H/S
DM1000G
L.C
START 2.31000GHz
STOP 2.40800GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 30dB
RL 20.0dBm
10dB/
MKR -57.33dBm
2.48350GHz
WAXESS
H/S
DM1000G
H.C
MKR
2.48350 GHz
-57.33 dBm
START 2.48000GHz
STOP 2.50000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

SPURIOUS EMISSION AT ANTENNA PORT

Standard Applicable

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.

4. Set the SA on View mode and then plot the result on SA screen.

5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

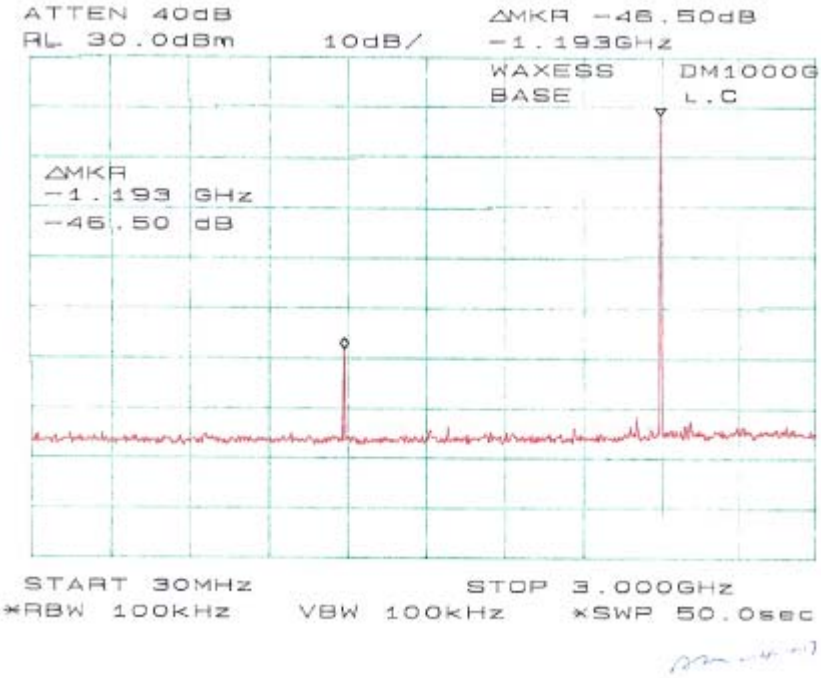
Environmental Conditions

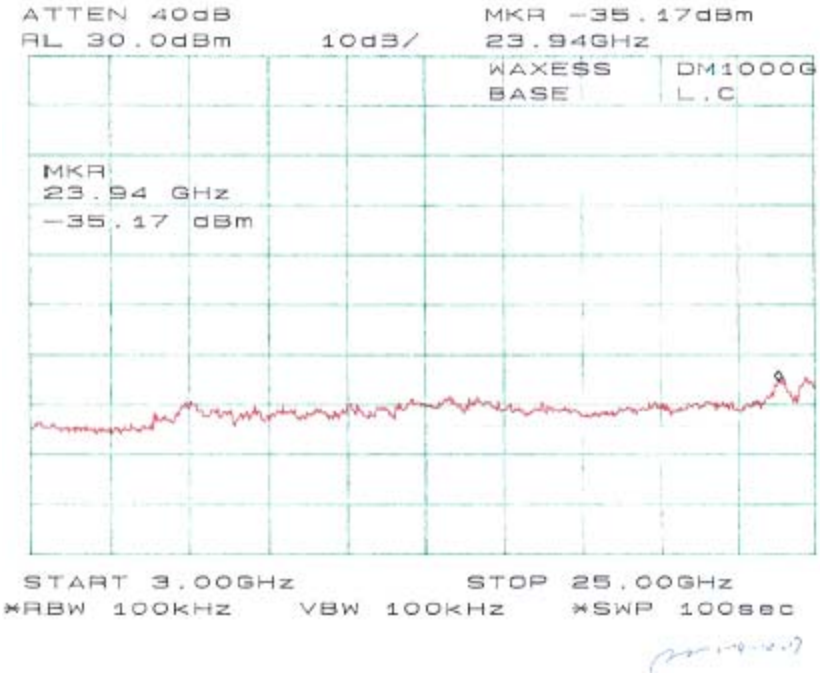
Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

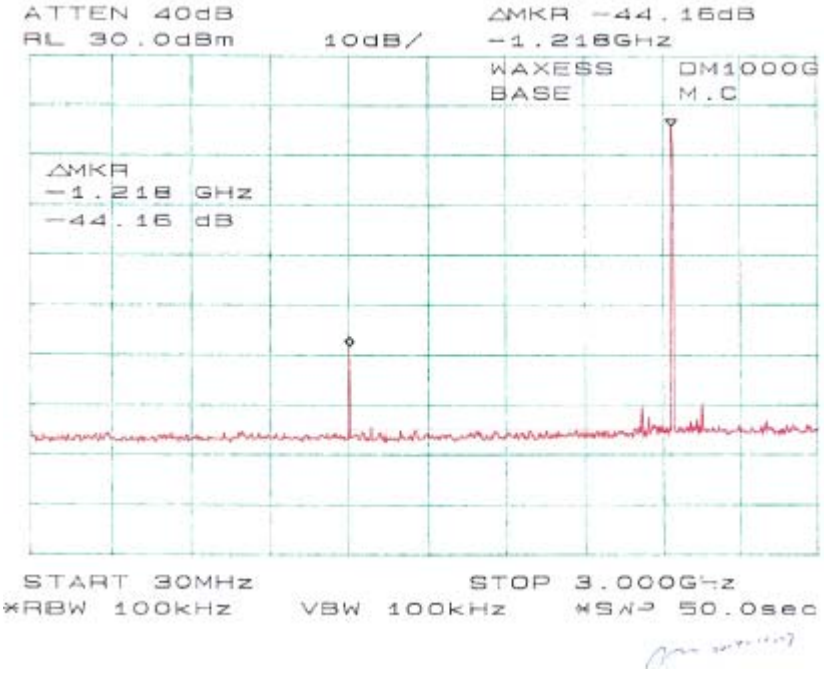
The testing was performed by Ming Jin on 2004-10-27.

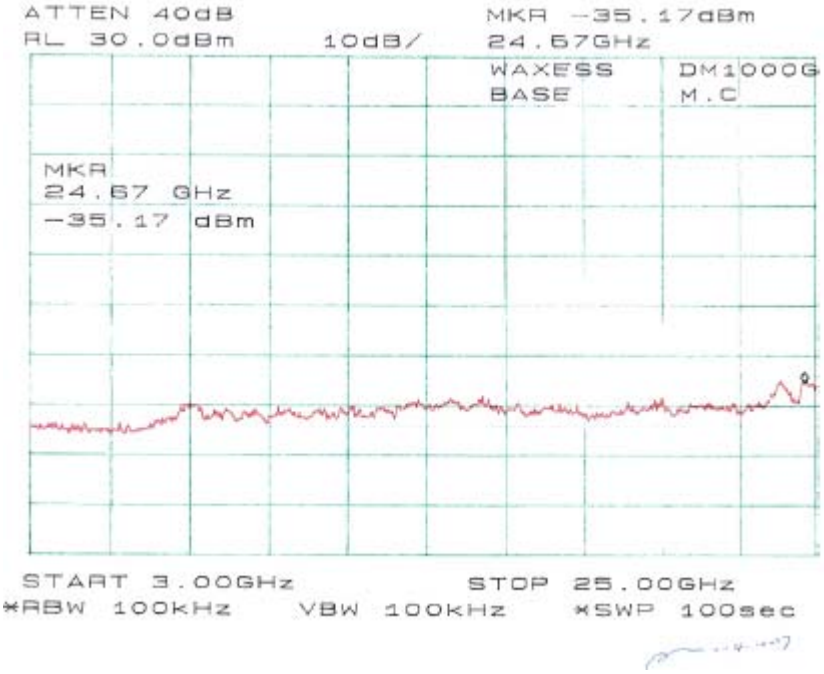
Measurement Results

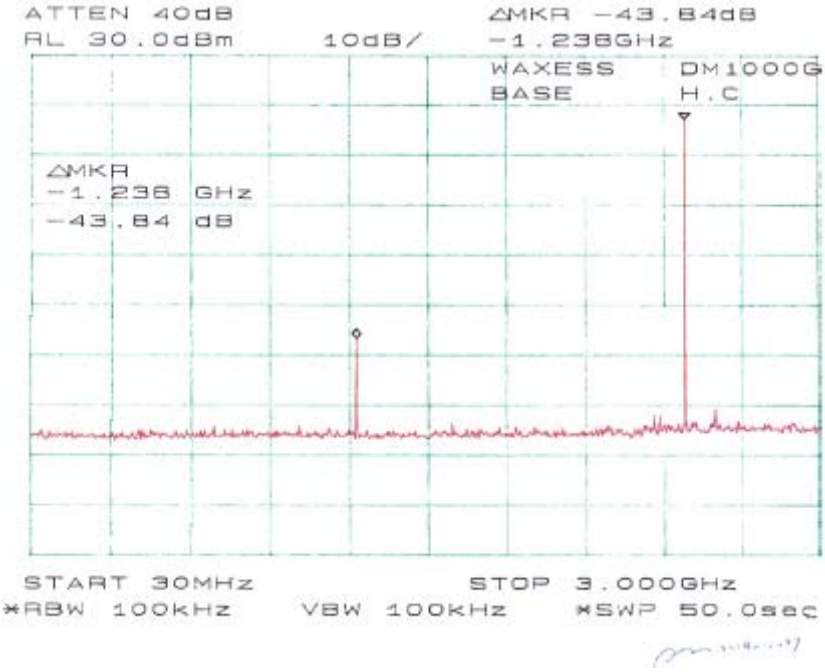
Please refer to the following plots.

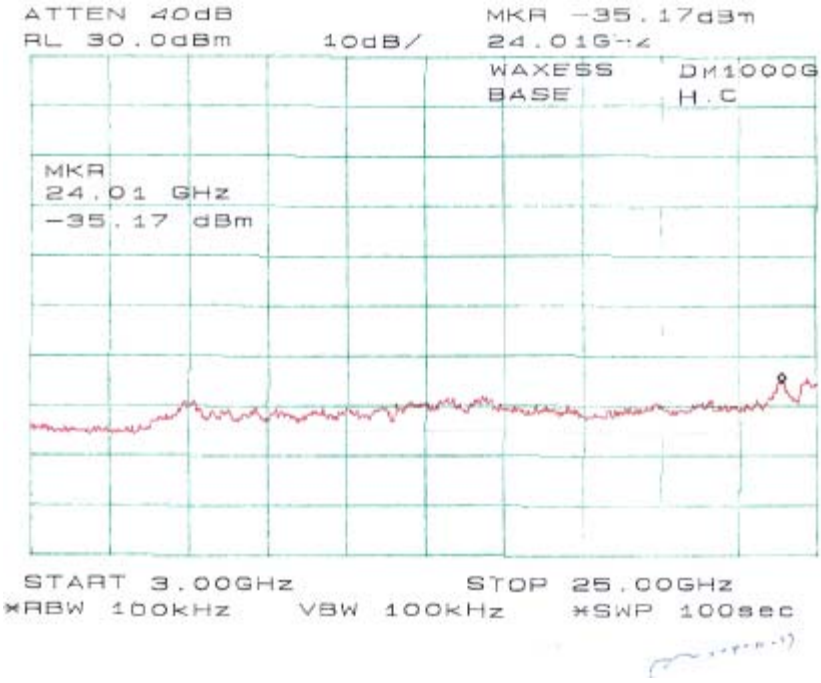

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -46.50dB
-1.193GHz
WAXESS
BASE
DM1000G
L.C
ΔMKR
-1.193 GHz
-46.50 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec

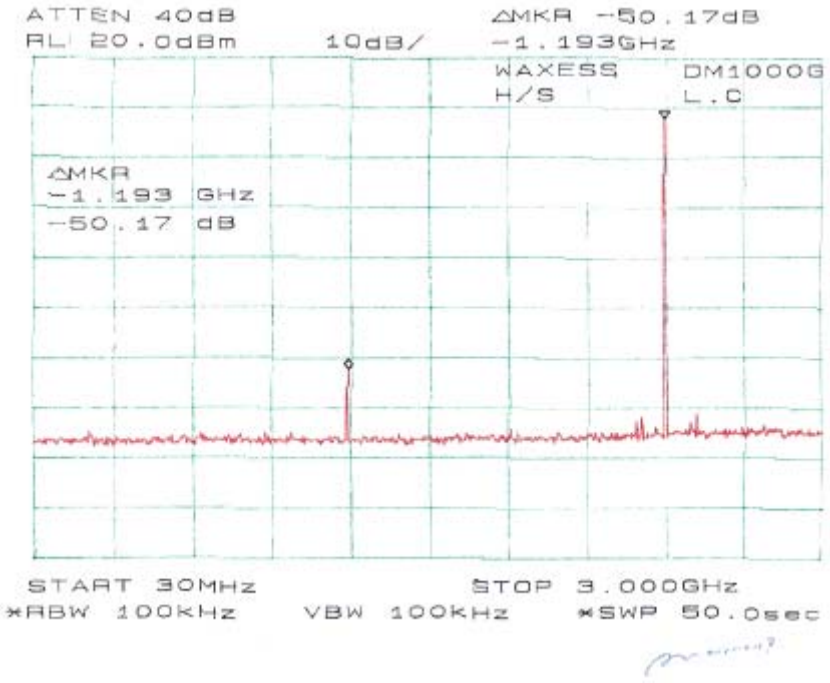

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -35.17dBm
23.94GHz
WAXESS
BASE
DM1000G
L.C
MKR
23.94 GHz
-35.17 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

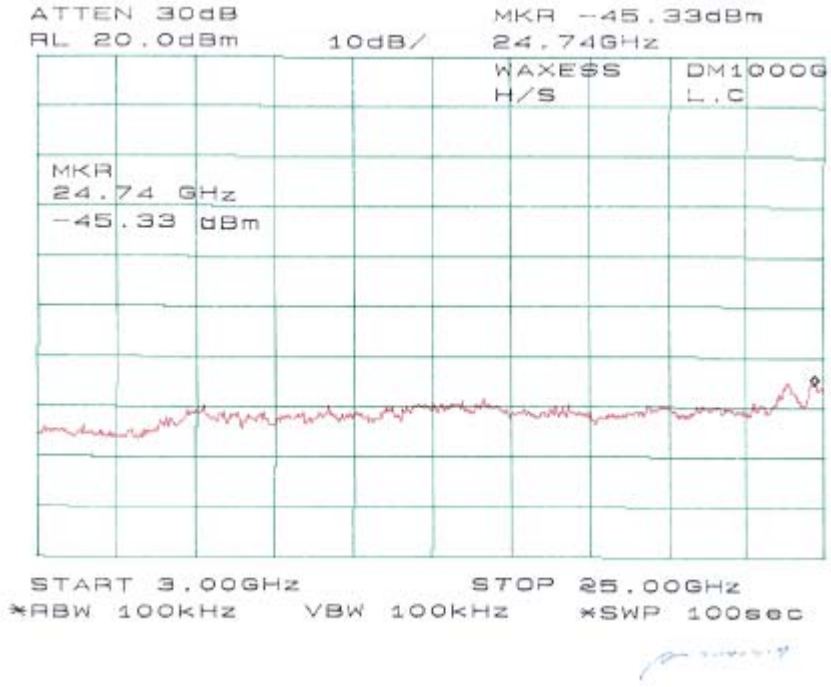

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -44.16dB
-1.218GHz
WAXESS
BASE
DM1000G
M.C
ΔMKR
-1.218 GHz
-44.16 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec

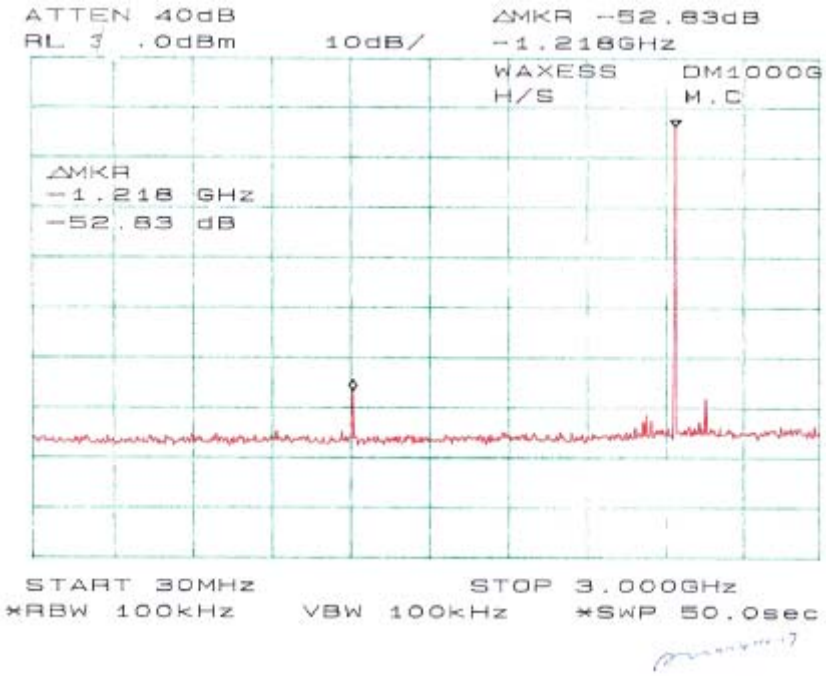

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -35.17dBm
24.67GHz
WAXESS
BASE
DM1000G
M.C
MKR
24.67 GHz
-35.17 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

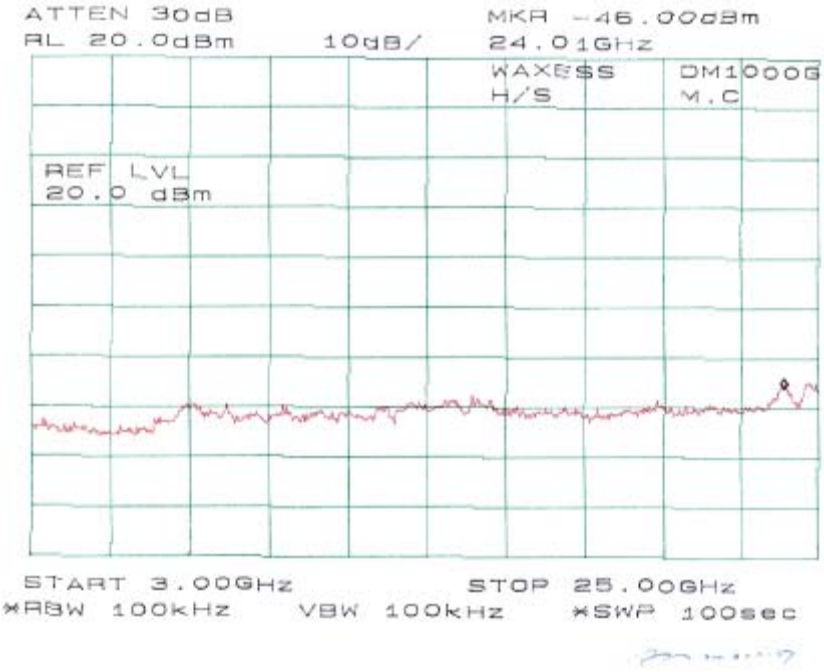

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -43.84dB
-1.238GHz
WAXESS
BASE
DM1000G
H.C
ΔMKR
-1.238 GHz
-43.84 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec

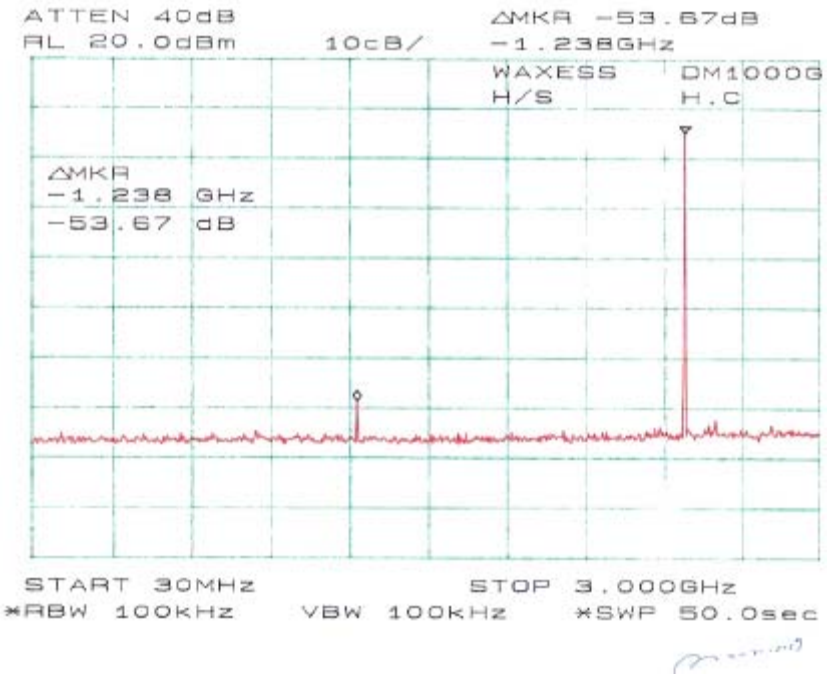

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -35.17dBm
24.01GHz
WAXESS
BASE
DM1000G
H.C
MKR
24.01 GHz
-35.17 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

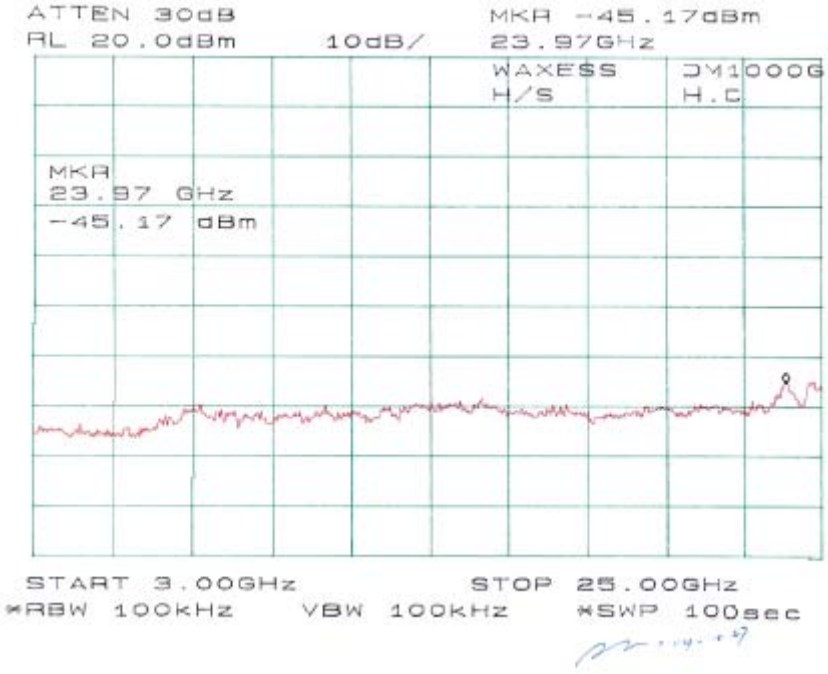

ATTEN 40dB
RL 20.0dBm
10dB/
ΔMKR -50.17dB
-1.193GHz
WAXESS
H/S
DM1000G
L.C
ΔMKR
-1.193 GHz
-50.17 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


ATTEN 30dB
RL 20.0dBm
10dB/
MKR -45.33dBm
24.74GHz
WAXESS
H/S
DM1000G
L.C
MKR
24.74 GHz
-45.33 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 40dB
RL 3 .0dBm
10dB/
ΔMKR -52.83dB
-1.218GHz
WAXESS
H/S
DM1000G
M.C
ΔMKR
-1.218 GHz
-52.83 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


ATTEN 30dB
RL 20.0dBm
10dB/
MKR -46.00dBm
24.01GHz
WAXESS
H/S
DM1000G
M.C
REF LVL
20.0 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 40dB
RL 20.0dBm
10cB/
ΔMKR -53.67dB
-1.238GHz
WAXESS
H/S
DM1000G
H.C
ΔMKR
-1.238 GHz
-53.67 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


ATTEN 30dB
RL 20.0dBm
10dB/
MKR -45.17dBm
23.97GHz
WAXESS
H/S
DM1000G
H.C
MKR
23.97 GHz
-45.17 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

SUMMARY OF TEST RESULTS FOR FCC PART 22 & PART 24

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1053	Field Strength of Spurious Radiation	Compliant
§2.1093	RF Exposure	Compliant
§ 15.107	Conducted Emissions	Compliant
§ 2.1046, § 22.912 (d) § 24.232	RF Output Power	Compliant
§ 2.1046, § 22.913 (a) § 24.232	Conducted Output Power	Compliant
§ 2.1049 § 22.917 § 22.905 § 24.238	Out of Band Emission, Occupied Bandwidth	Compliant
§ 2.1051, § 22.917 § 24.238(a)	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a) § 2.1055 (d) § 22.355 § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant
§ 22.917 §24.238	Band Edge	Compliant

§2.1093 - RF EXPOSURE

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Base, Cellular band:
Maximum peak output power at antenna input terminal: 33 (dBm)
Maximum peak output power at antenna input terminal: 1995.3 (mW)
Prediction distance: 20 (cm)
Predication frequency: 800 (MHz)
Antenna Gain (typical): 0 (dBi)
Maximum antenna gain: 1(numeric)
Power density at predication frequency at 20 cm: 0.4(mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency: 0.53 (mW/cm^2)

Base, PCS band:
Maximum peak output power at antenna input terminal: 30.17 (dBm)
Maximum peak output power at antenna input terminal: 1040 (mW)
Prediction distance: 20 (cm)
Predication frequency: 1900 (MHz)
Antenna Gain (typical): 0 (dBi)
Maximum antenna gain: 1(numeric)
Power density at predication frequency at 20 cm: 0.21(mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm^2)

Test Result

Base Unit at Cellular band and PCS band: The predicted power density level at 20 cm is 0.21 mW/cm^2. This is below the uncontrolled exposure limit of 0.21mW/cm^2 at 800MHz and 1mW/cm^2 at 1900 MHz. The EUT is used at least 20cm away from user's body. It is determined as mobile equipment.

§2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047.

Test Procedure

GSM digital mode is used by EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

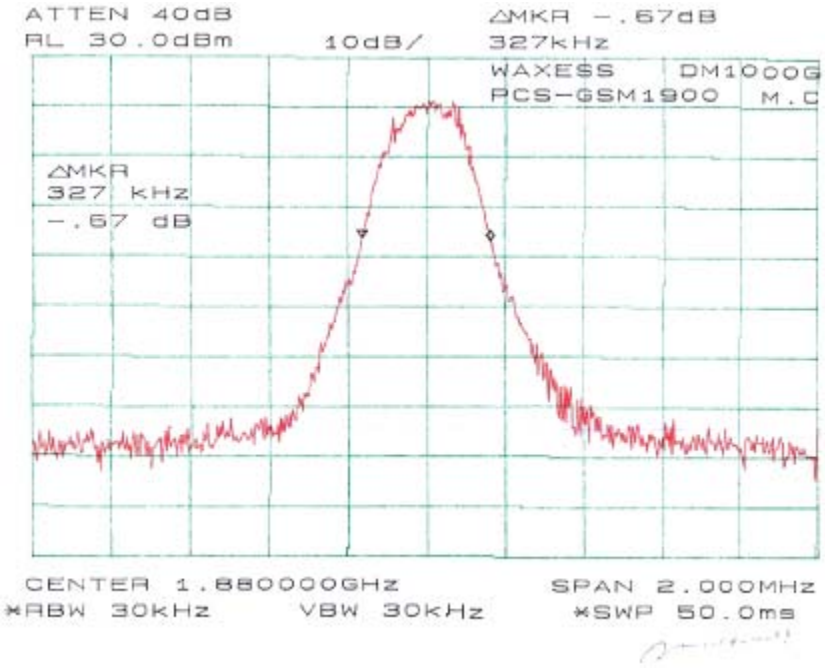
Environmental Conditions

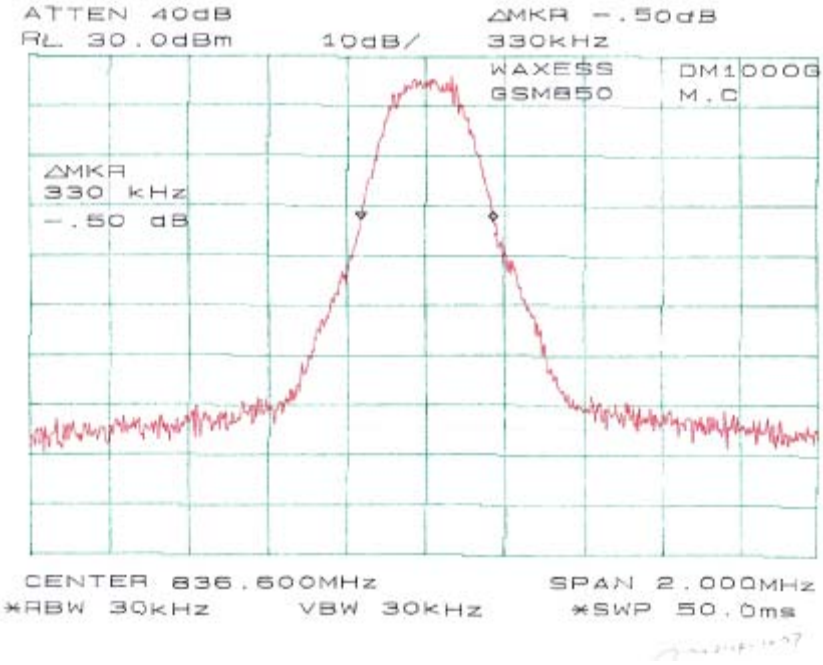
Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-10-27.

Test Results

Please refer to the hereinafter plots.


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.67dB
327kHz
WAXESS DM1000G
PCS-GSM1900 M.C
ΔMKR
327 kHz
-.67 dB
CENTER 1.880000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.50dB
330kHz
WAXESS DM1000G
GSM850 M.C
ΔMKR
330 kHz
-.50 dB
CENTER 836.600MHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms

§2.1053 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053.

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)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-07-03
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11
AH System	Horn Antenna	SAS-200/511	261	2004-08-02
HP	Spectrum Analyzer	8564E	3943A01781	2004-08-25
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-06-14

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-10-27.

Test Result

FCC Part 22: GSM850

-12.9 dBm at 1673.20 MHz

FCC Part 24: GSM1900

-25.8 dBm at 3760.00 MHz

Test Data for GSM850, Part22

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	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin dB
836.60	103.87	310	1.6	v	836.6	25.4	5.6	0.8	30.2		
836.60	106.26	0	1.5	h	836.6	27.9	5.6	0.8	32.7		
1673.20	42.40	90	1.2	v	1673.2	-31.5	6.8	1.2	-25.9	-13	-12.9
1673.20	44.80	110	1.6	h	1673.2	-33.9	6.8	1.2	-28.3	-13	-15.3
2509.80	25.40	150	1.5	h	2509.8	-49.3	7.6	1.5	-43.2	-13	-30.2
2509.80	24.70	45	1.6	v	2509.8	-50.4	7.6	1.5	-44.3	-13	-31.3
420.03	27.90	120	1.6	h	420.03	-57.5	0	0.3	-57.8	-13	-44.8
420.03	26.50	270	1.2	v	420.03	-59.2	0	0.3	-59.5	-13	-46.5

Test Data for GSM1900, Part24

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 dB	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin dB
1880.00	99.60	0	1.5	v	1880	22.7	8.3	1.3	29.7		
1880.00	89.50	90	1.6	h	1880	21.5	8.3	1.3	28.5		
3760.00	26.50	0	1.2	v	3760	-47.1	10.3	2	-38.8	-13	-25.8
3760.00	26.20	310	1.5	h	3760	-47.8	10.3	2	-39.5	-13	-26.5
347.15	25.90	270	1.2	v	347.15	-59.6	0	0.3	-59.9	-13	-46.9
347.15	25.40	60	1.2	h	347.15	-59.9	0	0.3	-60.2	-13	-47.2

§2.1046, §22.912(d), & §24.232 - RF POWER OUTPUT

Applicable Standard

According to FCC §2.1046 and §24.232 (1), mobile/portable stations are limited to 2 watts EIRP.
According to FCC §22.912(d), the ERP of mobile transmitters must not exceed 7 watts.

Test Procedure

1. On a test site, the EUT shall be placed at 1.5m height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the quasi-peak detector is used for the measurement.
4. The transmitter shall be switched on, if possible, without modulation and the measuring 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 the 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 (substitution antenna).
10. The substitution antenna shall be orientated 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. In 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 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 received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator 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 orientated for horizontal polarization.

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-07-03
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11
AH System	Horn Antenna	SAS-200/511	261	2004-08-02
Agilent	Spectrum Analyzer	8564E	3943A01781	2004-08-25

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-10-27.

Test Results

Test Data for GSM850

Frequency MHz	Substitution Reading dBm	Gain Corrected	Loss dB	EIRP dBm
836.6	25.4	5.6	0.8	30.2
836.6	27.9	5.6	0.8	32.7

Test Data for GSM1900

Frequency MHz	Substitution Reading dBm	Gain Corrected	Loss dB	EIRP dBm
1880	22.7	8.3	1.3	29.7
1880	21.5	8.3	1.3	28.5

Sample calculation:

Absolute level = substitution reading + antenna gain - cable loss

For example:

22.7 + 8.3 – 1.3 = 29.7 dBm

§2.1046, §22.913(a), & §24.232 – CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (b), in no case may the peak output power of a base station transmitter exceed 2 watt.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required
A.H. Systems	Horn Antenna	SAS200	261	2004-05-31
ETS	Logperiodic Antenna	3148	0004-1155	2004-10-11
EMCO	Biconical Antenna	3110B	9603-2315	2004-10-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

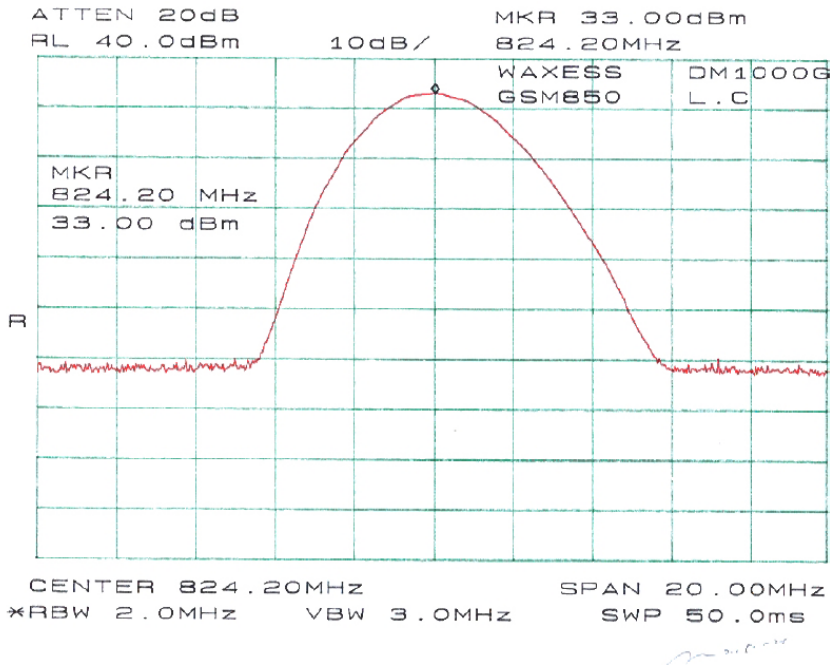
Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

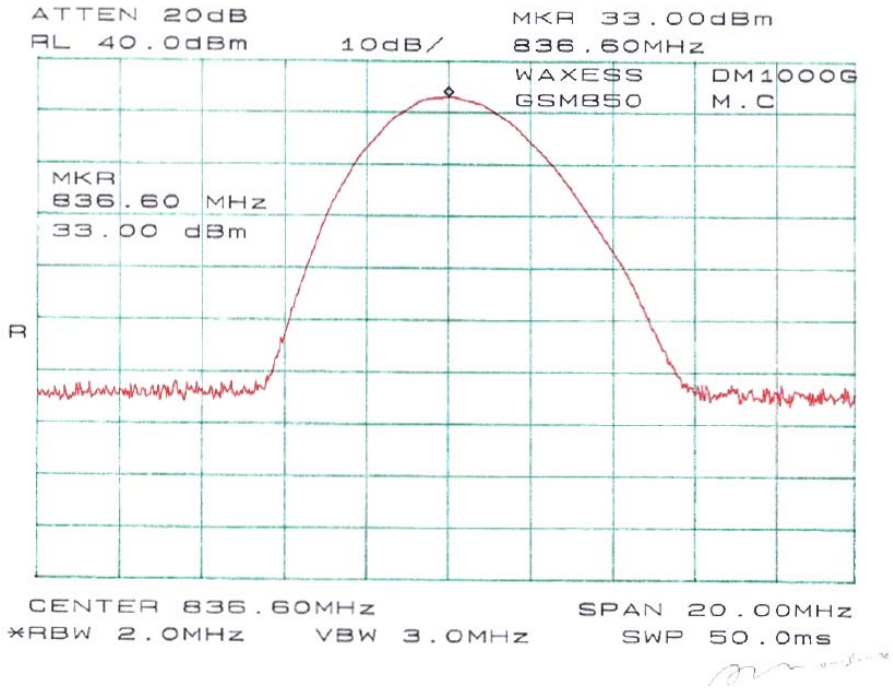
The testing was performed by Ming Jin on 2004-10-27.

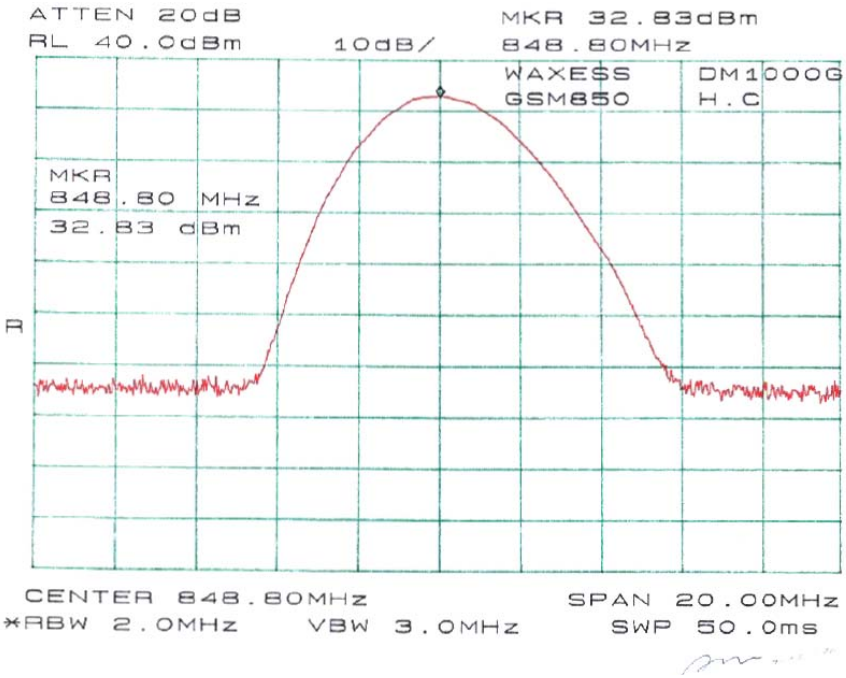
Test Results

MODE	Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
GSM850	LOW	824.20	33.00	1.995	7
	MIDDLE	836.60	33.00	1.995	7
	HIGH	848.80	32.83	1.919	7
GSM1900	LOW	1850.2	30.17	1.040	2
	MIDDLE	1880.0	28.83	0.764	2
	HIGH	1909.8	27.67	0.585	2

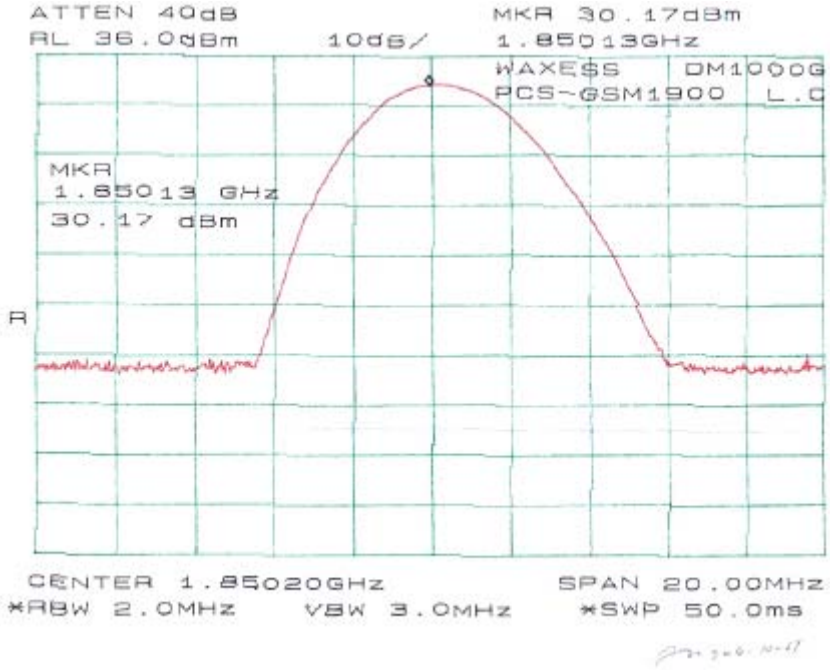
Plots of Conducted Output Power for GSM850, Part 22

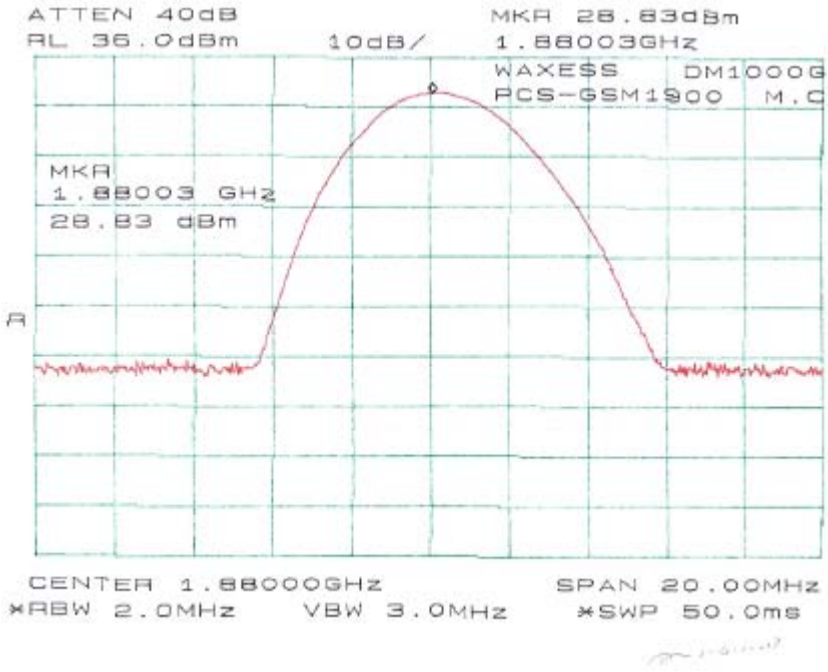


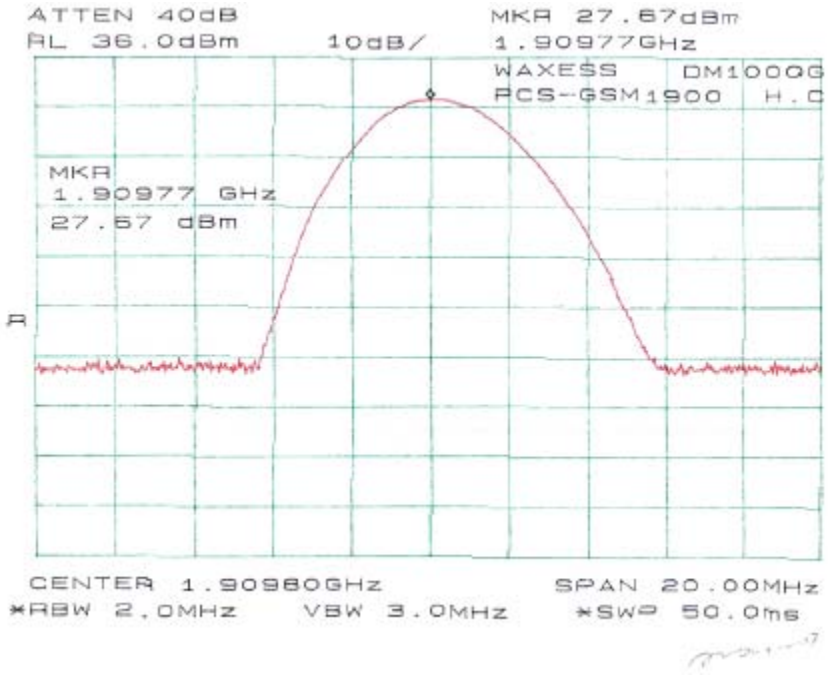




Plots of Conducted Output Power for GSM1900, Part 24




ATTEN 40dB
RL 36.0dBm
10dB/
MKR 28.83dBm
1.88003GHz
WAXESS DM1000G
PCS-GSM1900 M.C
MKR
1.88003 GHz
28.83 dBm
R
CENTER 1.88000GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
*SWP 50.0ms


ATTEN 40dB
RL 36.0dBm
10dB/
MKR 27.67dBm
1.90977GHz
WAXESS DM1000G
PCS-GSM1900 H.C
MKR
1.90977 GHz
27.67 dBm
R
CENTER 1.90980GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
*SWP 50.0ms

§2.1049, §22.917, §22.905, & §24.238 - OCCUPIED BANDWIDTH

Applicable Standard

Requirements: CFR 47, Section 2.1049, Section 22.901, Section 22.917 and Section 24.238.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the 26 dB bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

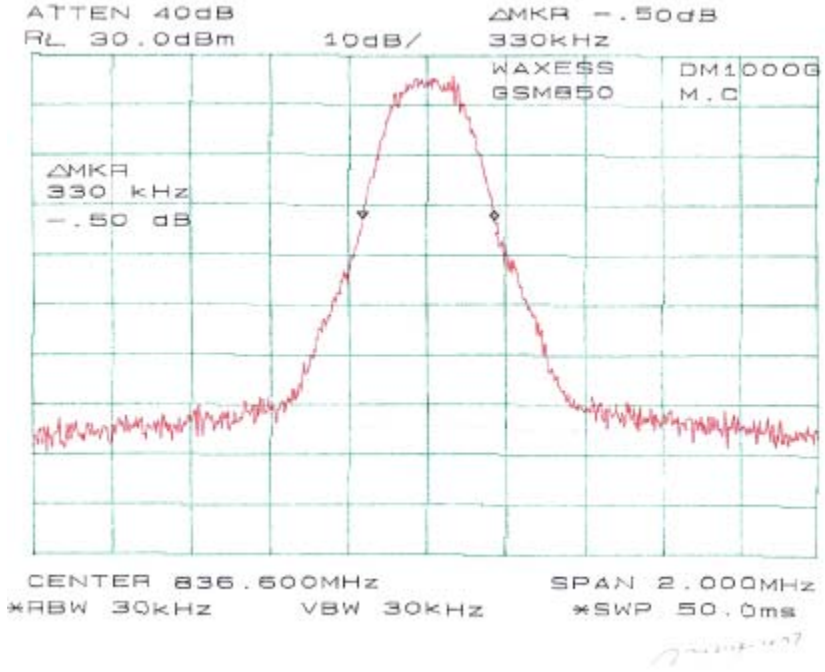
Environmental Conditions

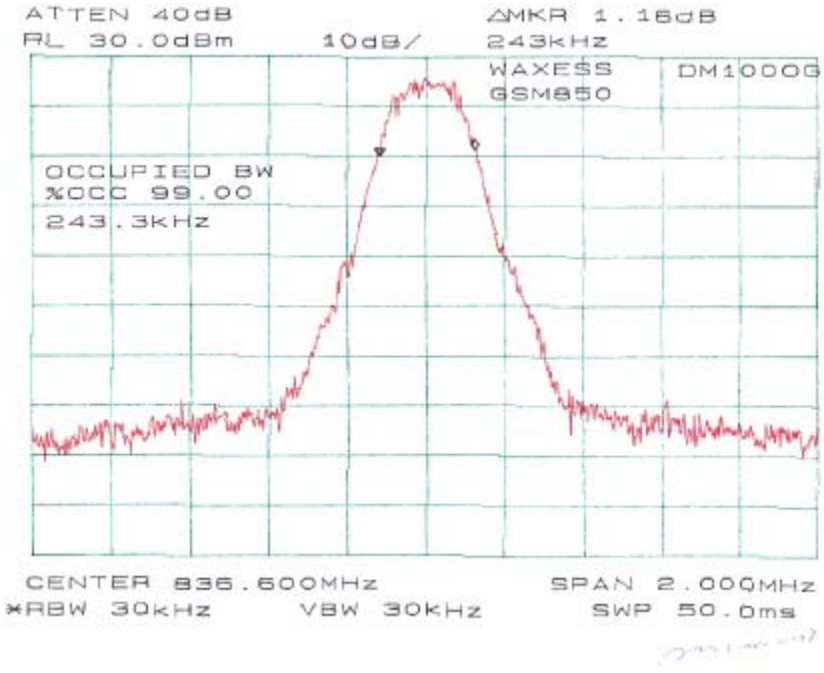
Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

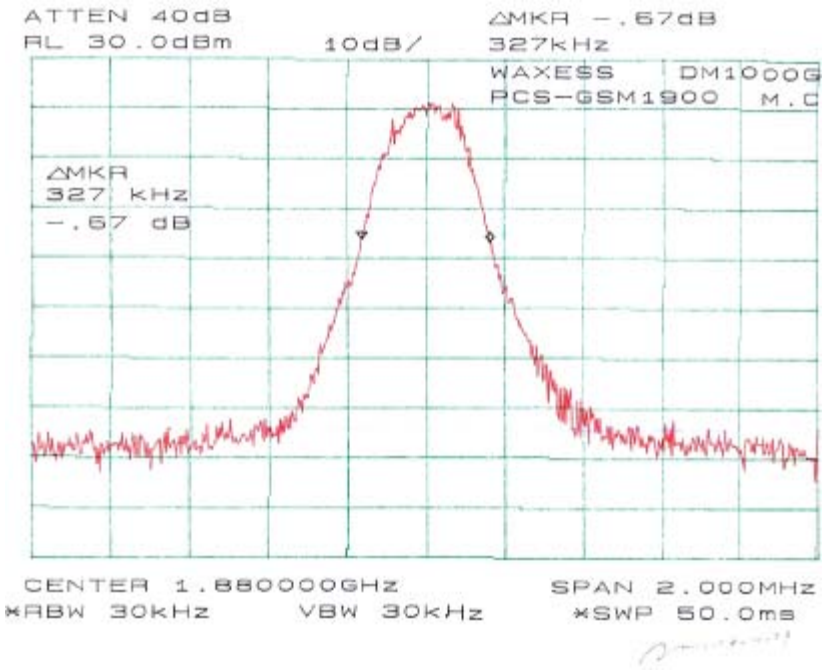
The testing was performed by Ming Jin on 2004-10-27.

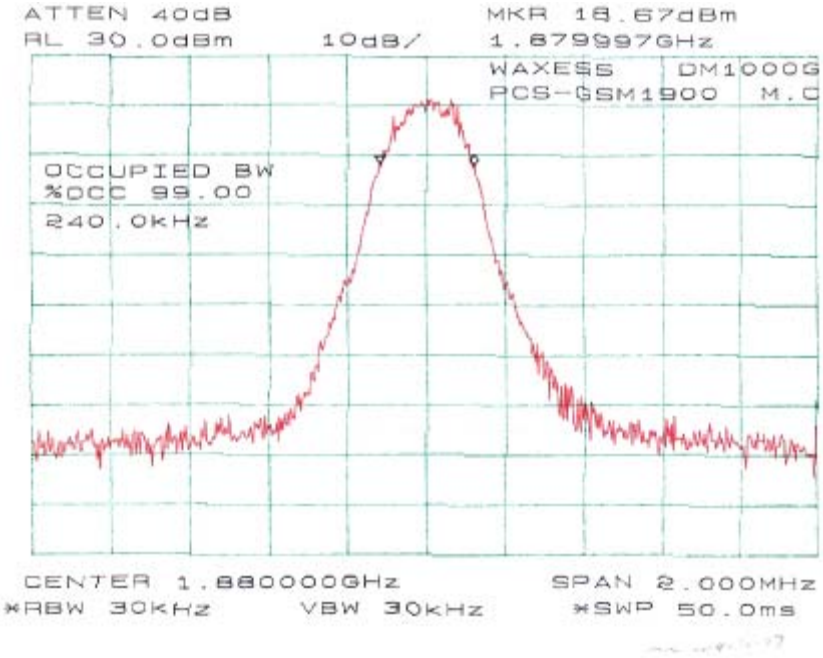
Test Results

Please refer to the following plots.


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.50dB
330kHz
WAXESS
GSM850
DM1000G
M.C
ΔMKR
330 kHz
-.50 dB
CENTER 836.600MHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR 1.16dB
243kHz
WAXESS
GSM850
DM1000G
OCCUPIED BW
%OCC 99.00
243.3kHz
CENTER 836.600MHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.67dB
327kHz
WAXESS DM1000G
PCS-GSM1900 M.C
ΔMKR
327 kHz
-.67 dB
CENTER 1.880000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 18.67dBm
1.879997GHz
WAXESS DM1000G
PCS-GSM1900 M.C
OCCUPIED BW
%OCC 99.00
240.0kHz
CENTER 1.880000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms

§2.1051, §22.917, & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

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

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

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 10th harmonic.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

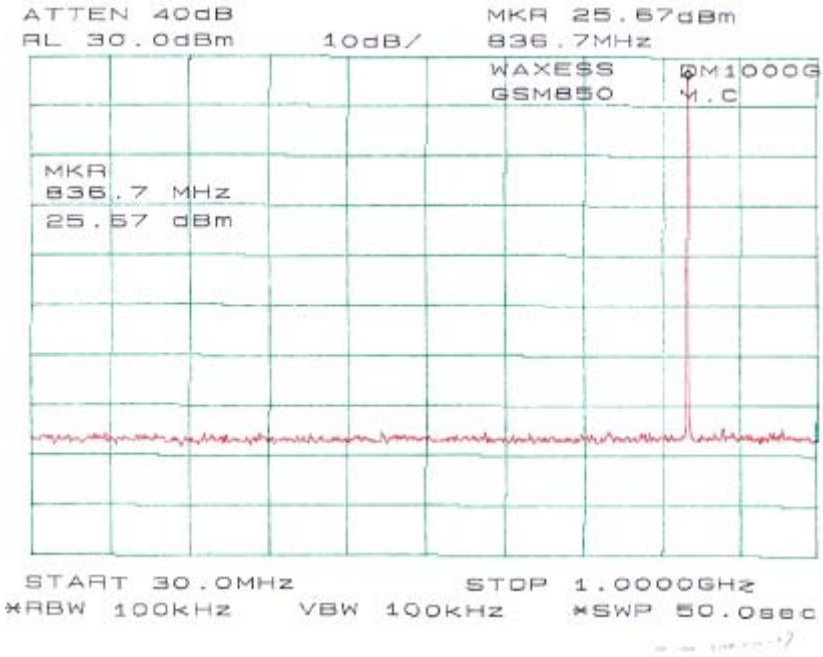
Environmental Conditions

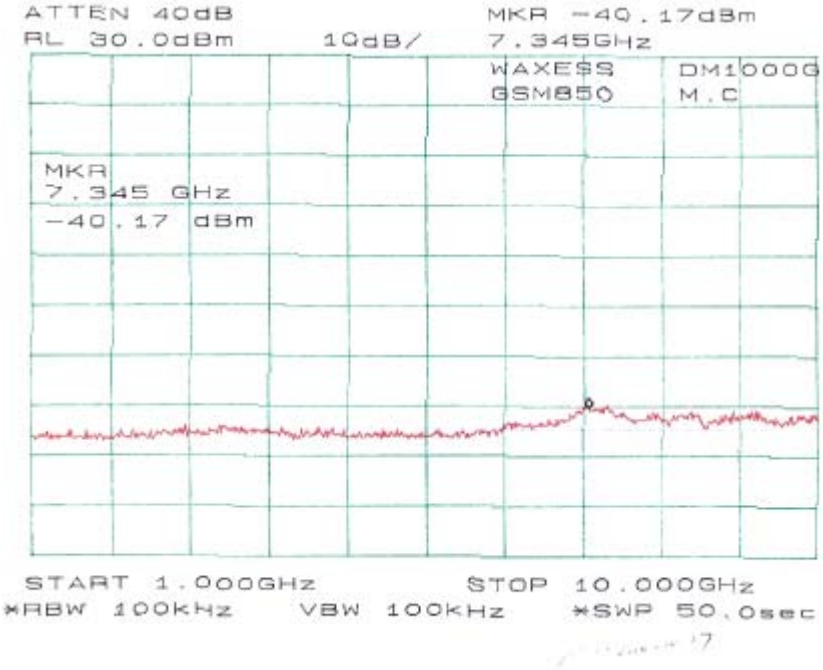
Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

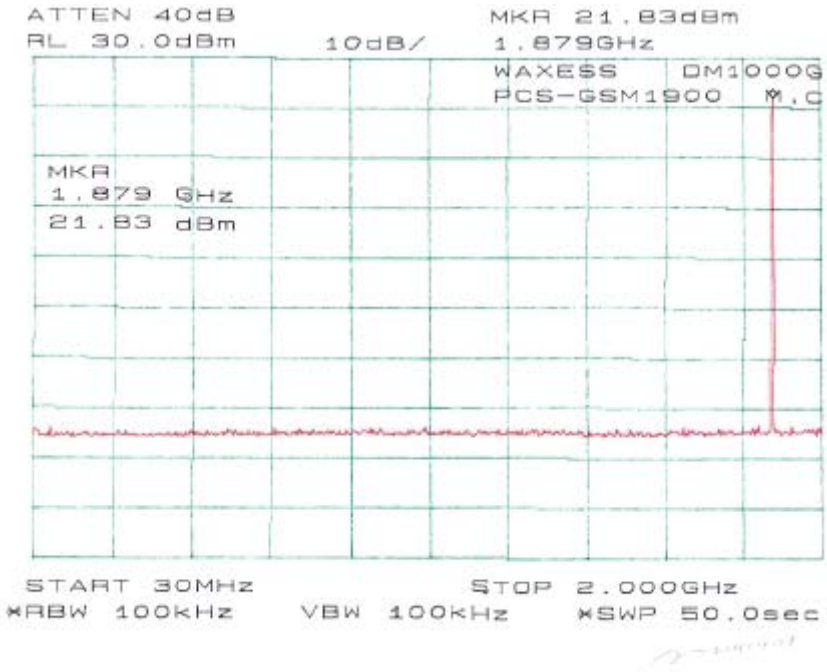
The testing was performed by Ming Jin on 2004-10-27.

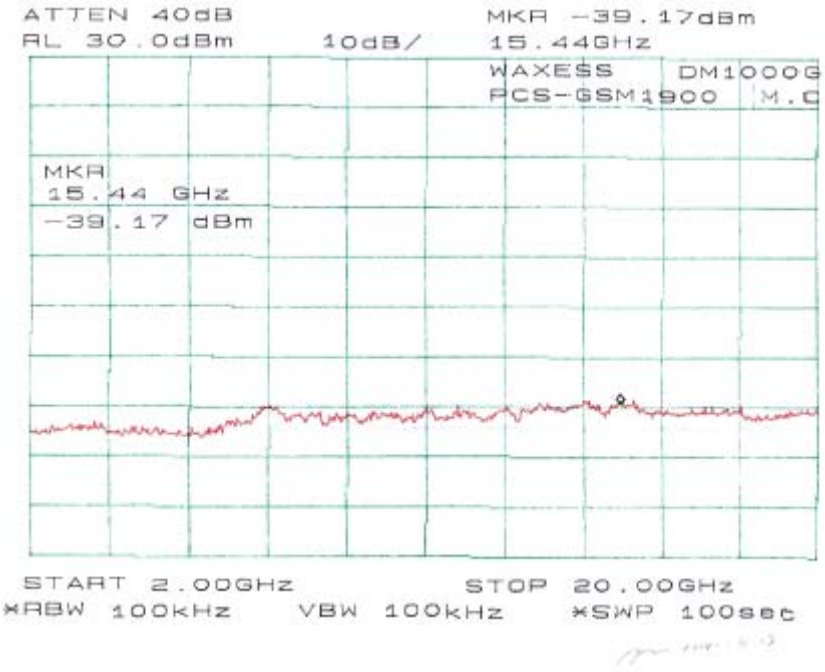
Test Results

Please refer to the hereinafter plots.


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 25.67dBm
836.7MHz
WAXESS
GSM850
DM1000G
M.C
MKR
836.7 MHz
25.67 dBm
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -40.17dBm
7.345GHz
WAXESS
GSM850
DM1000G
M.C
MKR
7.345 GHz
-40.17 dBm
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 21.83dBm
1.879GHz
WAXESS DM1000G
PCS-GSM1900 M.C
MKR
1.879 GHz
21.83 dBm
START 30MHz
STOP 2.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -39.17dBm
15.44GHz
WAXESS DM1000G
PCS-GSM1900 M.C
MKR
15.44 GHz
-39.17 dBm
START 2.00GHz
STOP 20.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec

§2.1055 (a), §2.1055 (d), §22.355, & §24.235 - FREQUENCY STABILITY

Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1_Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile [SU][le][/SU]3 watts (ppm)	Mobile [le]3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

According to §24.235, The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required
Tenney	Temperature Chamber -50° to + 100°	Versa	12.222-193	2004-04-23

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

The testing was performed by Ming Jin on 2004-10-27.

Test Results

GSM 850

Reference Frequency : 836.6000 MHz, Limit : 2.5 ppm			
		Frequency Measure with Time Elapsed	
Temperature C	Power supplied Vdc	MCF (MHz)	Error ppm
50	3.6	836.5999	-0.12
40	3.6	836.5999	-0.12
30	3.6	836.6000	0
20	3.6	836.6000	0
10	3.6	836.6001	0.12
0	3.6	836.6001	0.12
-10	3.6	836.6002	0.24
-20	3.6	836.6002	0.24
-30	3.6	836.6002	0.24

Reference Frequency : 836.6000 MHz, Limit : 2.5 ppm		
	Frequency Measure with Time Elapsed	
Power supplied Vdc	Frequency (MHz)	Error ppm
3.1	836.6001	0.12

GSM 1900

Reference Frequency : 1880.0000 MHz, Limit : 2.5 ppm			
		Frequency Measure with Time Elapsed	
Temperature C	Power supplied Vdc	MCF (MHz)	Error ppm
50	3.6	1879.9993	-0.37
40	3.6	1879.9996	-0.21
30	3.6	1879.9998	-0.11
20	3.6	1880.0000	0
10	3.6	1880.0000	0
0	3.6	1880.0002	0.11
-10	3.6	1880.0004	0.22
-20	3.6	1880.0004	0.22
-30	3.6	1880.0005	0.27

Reference Frequency : 1880 MHz, Limit : 2.5 ppm		
	Frequency Measure with Time Elapsed	
Power supplied Vdc	Frequency (MHz)	Error ppm
3.1	1880.0002	0.11

§22.917 & §24.238 – BAND EDGE

Applicable Standard

According to § 22.917, 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.

According to §24.238, 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.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency, RBW set to 30KHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

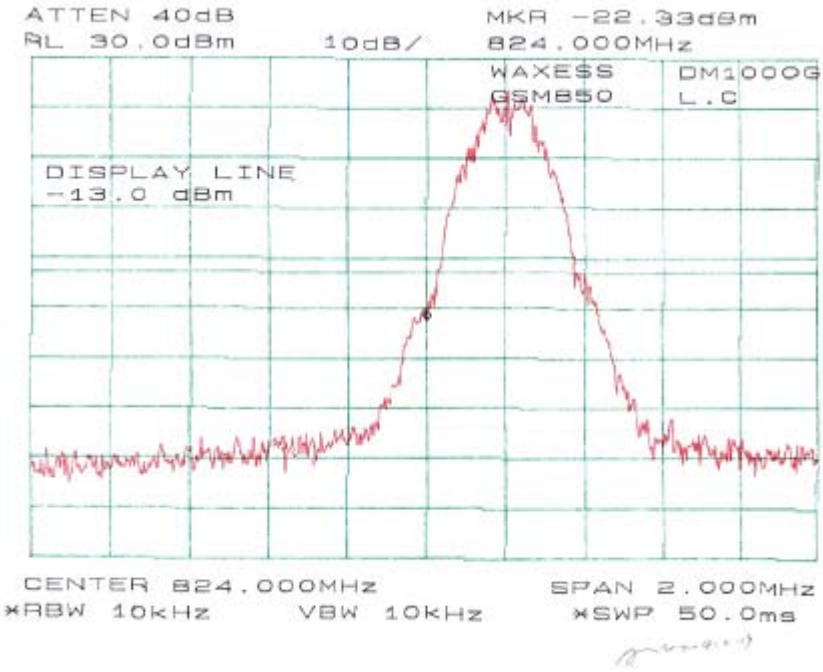
Environmental Conditions

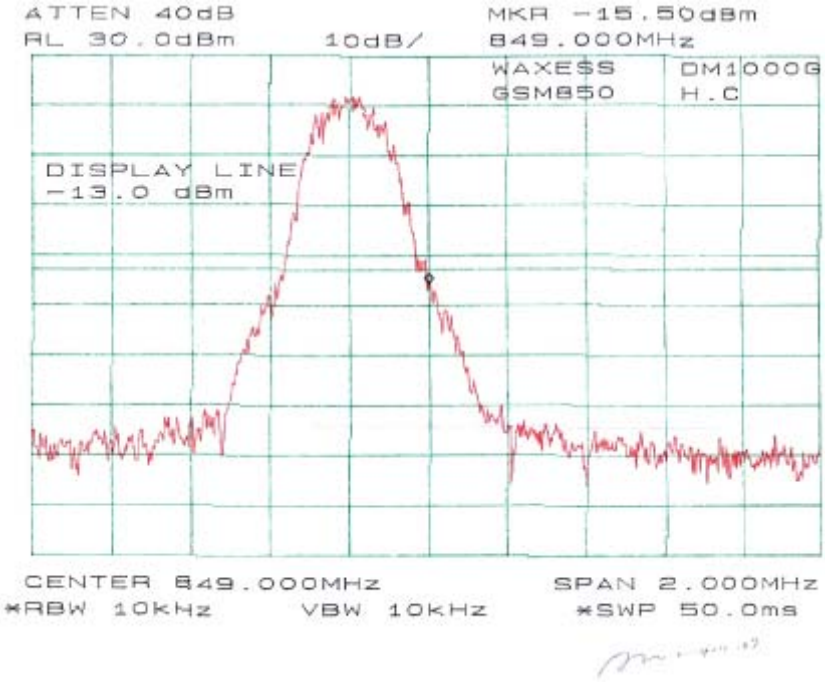
Temperature:	21° C
Relative Humidity:	40%
ATM Pressure:	1019 mbar

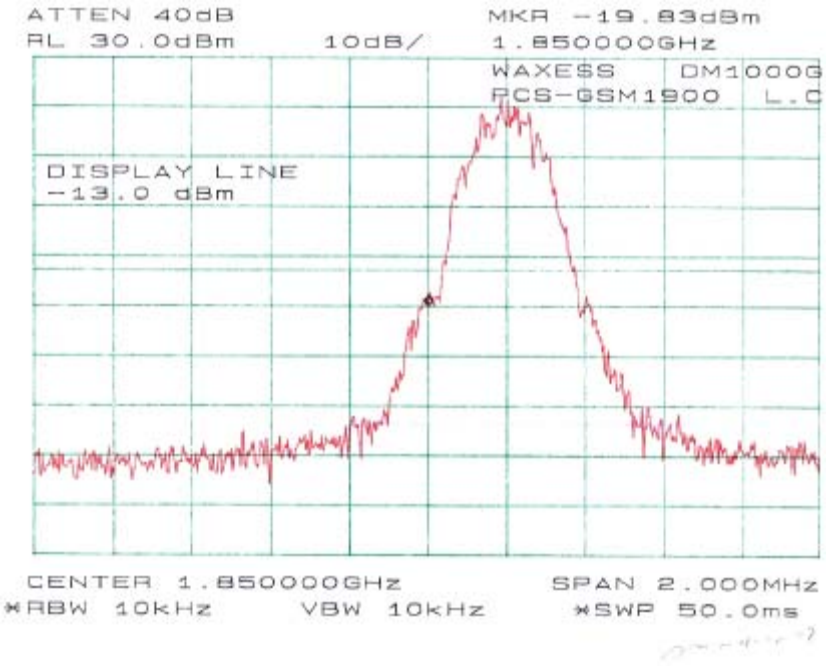
The testing was performed by Ming Jin on 2004-10-27.

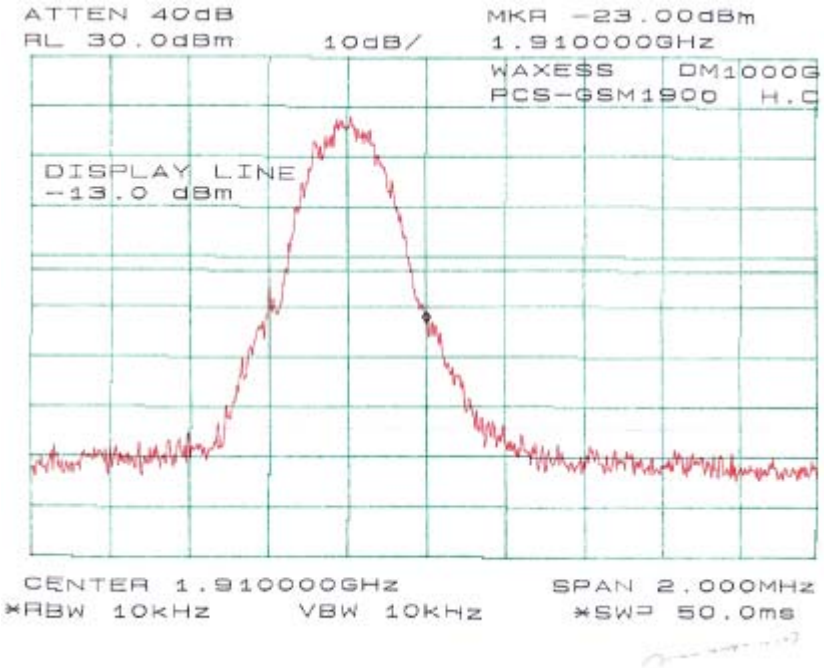
Test Results

Please refer to the following plots.


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -22.33dBm
824.000MHz
WAXESS
GSM850
DM1000G
L.C
DISPLAY LINE
-13.0 dBm
CENTER 824.000MHz
SPAN 2.000MHz
*RBW 10kHz
VBW 10kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -15.50dBm
849.000MHz
WAXESS
GSM850
DM1000G
H.C
DISPLAY LINE
-13.0 dBm
CENTER 849.000MHz
SPAN 2.000MHz
*RBW 10kHz
VBW 10kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -19.83dBm
1.850000GHz
WAXESS DM1000G
PCS-GSM1900 L.C
DISPLAY LINE
-13.0 dBm
CENTER 1.850000GHz
SPAN 2.000MHz
*RBW 10kHz
VBW 10kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -23.00dBm
1.910000GHz
WAXESS DM1000G
PCS-GSM1900 H.C
DISPLAY LINE
-13.0 dBm
CENTER 1.910000GHz
SPAN 2.000MHz
*RBW 10kHz
VBW 10kHz
*SWP 50.0ms