FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

Newcont Ele. Co., Ltd.

1Unit D, 40/F., Block C, Electronics Science & Technology Building, Shennan Middle Road,
Futian District, Shenzhen, Guangdong Province, P.R. China

FCC ID: QFENTP-6451XX

This Report Concerns:	**Equipment Type:**
☒ Original Report	2.4 GHz digital Cordless Telephone

Test Engineer:	Snell Leong
Report No.:	R0410042
Report Date:	2004-12-11
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

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Newcont Ele. Co., Ltd.'s,* FCC ID: QFENTP-6451XX (model: NTP-6451XX), or the "EUT" as referred to in this report is a hopping spread spectrum system, 2.4GHz digital cordless phone which is measured approximately 1.5"L x 2.25"W x 5.75" H for handset and 5.5"L x 6.75"W x 4.75" H for base. The EUT is a DSS device operates at the frequency range of 2401.80 – 2479.40MHz, with the maximum conducted output power of 13.9 dBm (0.02455 W) for handset, 16.1 dBm (0.04074 W) for base.

** The test data gathered are from a production sample, S/N: N0032048, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *Newcont Ele. Co., Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003& 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 C63.4-2003& 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.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components.

Once loaded, set the Tx channel to low, mid and high for testing.

Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

Schematics / Block Diagram

Please refer to Appendix A.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Panasonic	Telephone	KX-T3175	6IBTB142741	ACJMLA-75986-MT-E
Teltone Corp	Simulator	TLS-3B-01	80071	None

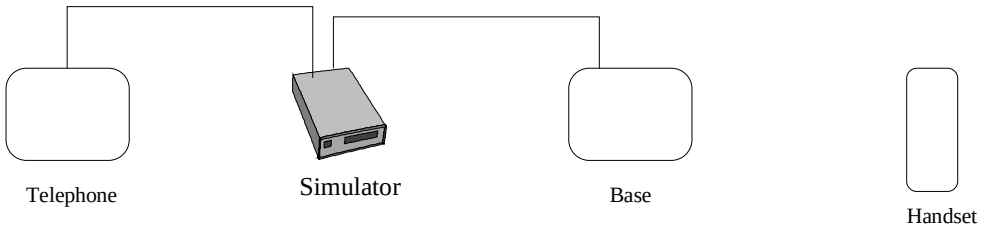
External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
None-Shielded Telephone Cable	2.0	RJ-11 Port/EUT	Telephone simulator RJ11Port
None-Shielded Telephone Cable	2.0	RJ11 Port/Simulator	Telephone RJ11 Port/ Panasonic

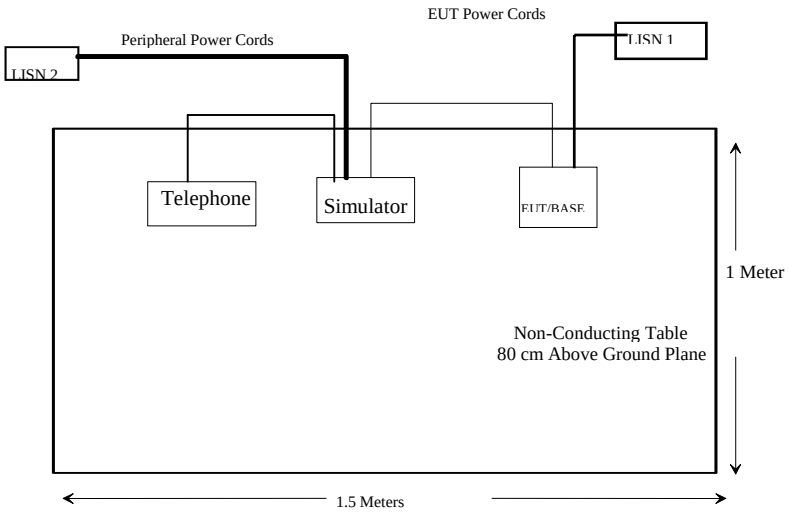
Power Supply Information (For Base)

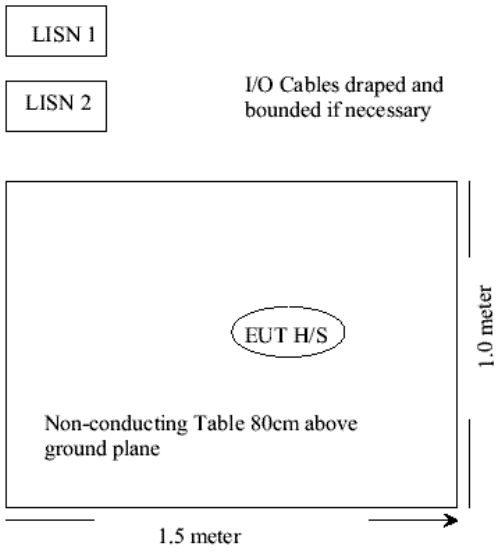
Manufacturer	Description	Model	Serial Number	FCC ID
Ktec	AC/DC Adapter	KA12D090030024U	None	None

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, 15.247 (d)	Radiated Emissions in Restricted Bands	Compliant
§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 35.2 Second Period of time (0.4 x Number of Channel)	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(5) § 2.1093	RF Safety Requirements	Compliant
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§ 15.209 (f)	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 – 2003 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:	22° C
Relative Humidity:	40%
ATM Pressure:	1013 mbar

**The testing was performed by Snell Leong on 2004-10-21.*

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:

-30.0 dB at **17.9 MHz** in the **Line** conductor, Base

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
17.900	20.0	AVE	LINE	50.00	-30.0
17.900	19.2	AVE	NEUTRAL	50.00	-30.8
13.300	17.9	AVE	LINE	50.00	-32.1
15.100	14.8	AVE	NEUTRAL	50.00	-35.2
17.900	21.4	QP	LINE	60.00	-38.6
0.610	16.3	QP	LINE	56.00	-39.7
17.900	19.2	QP	NEUTRAL	60.00	-40.8
13.300	18.1	QP	LINE	60.00	-41.9
15.100	17.9	QP	NEUTRAL	60.00	-42.1
0.565	13.2	QP	NEUTRAL	56.00	-42.8
0.565	3.1	AVE	NEUTRAL	46.00	-42.9
0.610	3.1	AVE	LINE	46.00	-42.9

Plot of Conducted Emissions Test Data

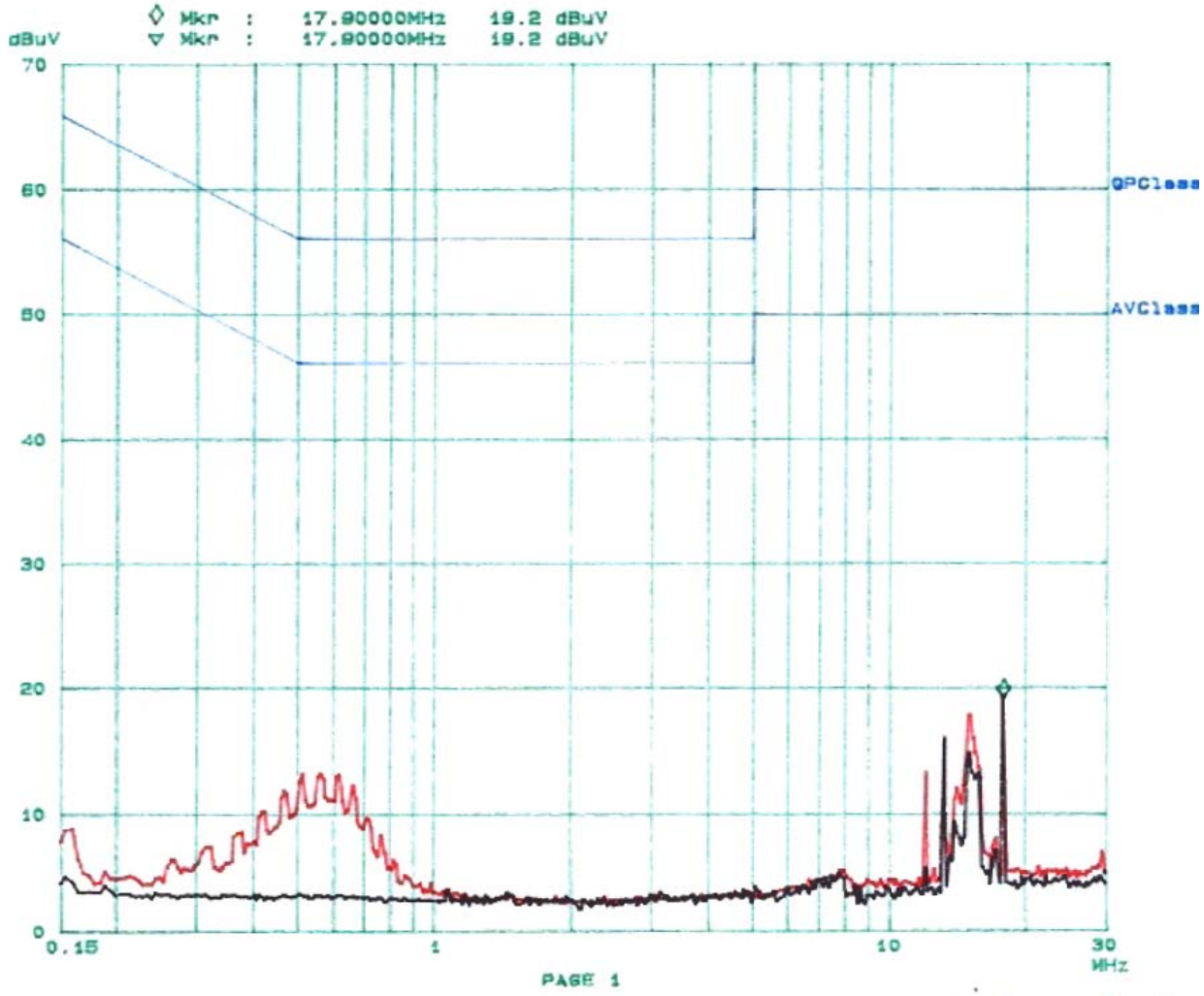
Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

.Bay Area Compliance Laboratory Corp 21. Oct 04 14:17
Class B

EUT: 2.4 GHz wireless phone
Manuf: .Newcont
Op Cond: Normal
Operator: SNELL
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



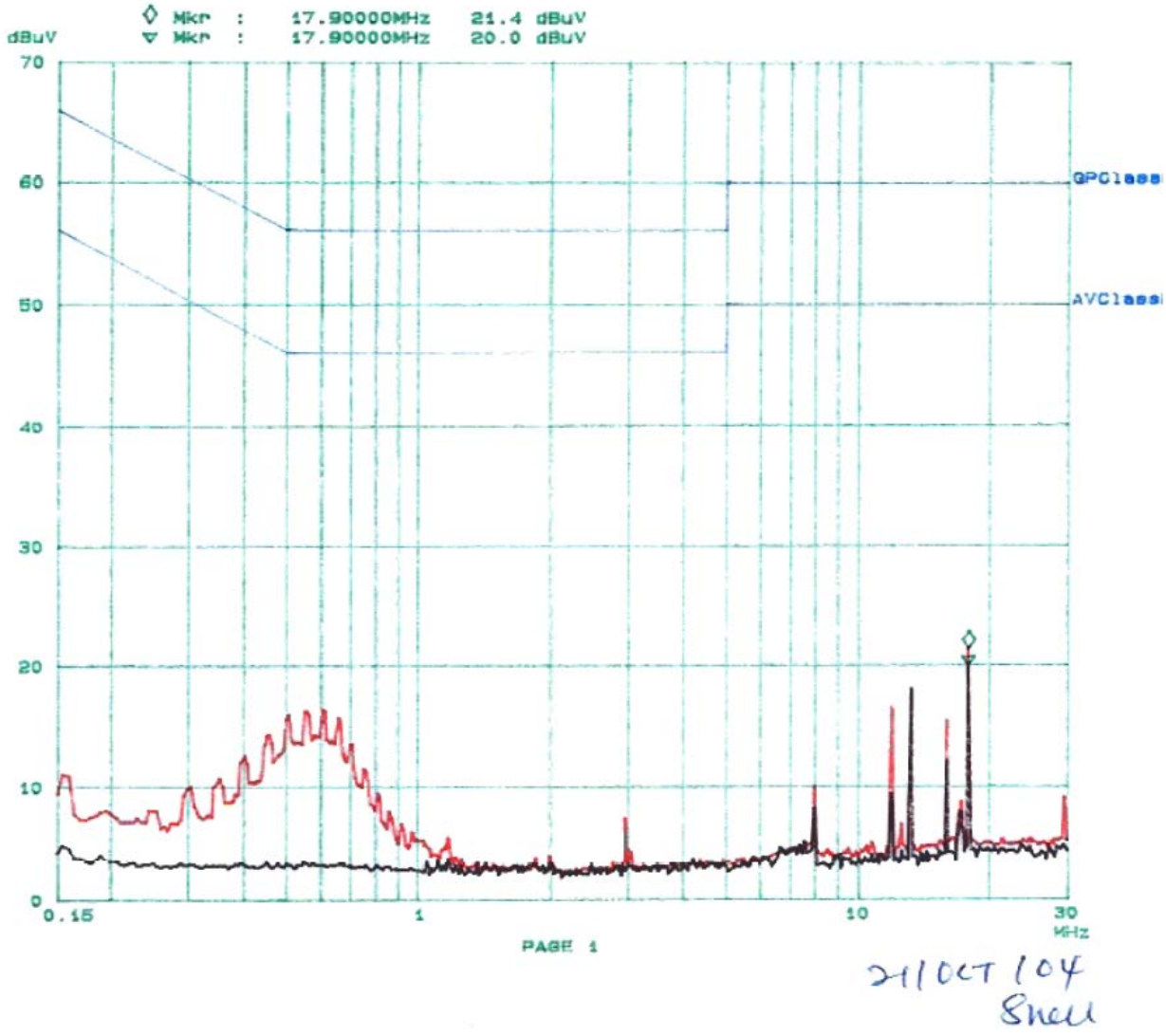
21 OCT 04
Snell

.Bay Area Compliance Laboratory Corp 21. Oct 04 13:57
Class B

EUT: 2.4 GHz wireless phone
Manuf: .Newcont
Op Cond: Normal
Operator: SNELL
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



21 OCT 04
Snell

§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 $\pm$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 C63.4-2003. 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.

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. Date
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-06-14
HP	Amplifier, Pre	8447E	1937A01057	2004-08-04
Agilent	Analyzer, Spectrum	8564E	3943A01781	2004-10-04
Agilent	Analyzer, Spectrum	E4448A	1030645	2004-10-04
ETS	Antenna, Biconical	3110B	9603-2315	2004-01-11
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2004-08-01
EMCO	Antenna, logperiodic	3146	2101	2003-11-08

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

**The testing was performed by Snell Leong on 2004-10-22.*

Test Procedure

For the radiated emissions test, the base and simulator were connected to the AC floor 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, the EUT measured -0.6dB margin for handset, -1.4dB margin for base, within the measurement uncertainty of ±4.0dB, and had the worst margin of:

-4.2 dB at **4803.60 MHz** in the **Vertical** polarization, Low Channel, 3 meters, Handset

-0.6 dB at **4880.316 MHz** in the **Horizontal** polarization, Middle Channel, 3 meters, Handset

-4.0 dB at **4958.80 MHz** in the **Horizontal** polarization, High Channel, 3 meters, Handset

-8.9 dB at **878.6 MHz** in the **Vertical** polarization, Unintentional Emission, 3 meters, Handset

-1.9 dB at **9606.91 MHz** in the **Vertical** polarization, Low Channel, 3 meters, Base

-3.4 dB at **4880.316 MHz** in the **Vertical** polarization, Middle Channel, 3 meters, Base

-5.7 dB at **4958.80 MHz** in the **Horizontal** polarization, High Channel, 3 meters, Base

-1.4 at **dB 147.46 MHz** in the **Vertical** polarization, Unintentional Emission, 3 meters, Base

3 Meters Radiated Emission Test Data, Handset

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV	Degree	Meter	H/V	dB/m	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel, 2401.8 MHz											
2401.8000	120.3	330	3.5	V	28.1	0.9	35.8	113.5			FUND/PEAK
2401.8000	121.8	180	3.1	H	28.1	0.9	35.8	115.0			FUND/PEAK
4803.6000	69.0	345	2.0	V	32.5	3.1	34.8	69.8	74	-4.2	PEAK
12009.28	56.7	90	1.5	V	39.6	5.3	32.0	69.6	74	-4.4	PEAK
12009.28	35.9	90	2.5	H	39.6	5.3	32.0	48.8	54	-5.2	AVE
12009.28	55.4	45	2.5	H	39.6	5.3	32.0	68.3	74	-5.7	PEAK
12009.28	35.4	45	1.5	V	39.6	5.3	32.0	48.3	54	-5.7	AVE
9607.2	36.2	345	1.8	V	38.4	5.5	34.2	45.9	54	-8.1	AVE
9607.2	35.7	0	2.5	H	38.4	5.5	34.2	45.4	54	-8.6	AVE
9607.2	55.3	345	1.8	V	38.4	5.5	34.2	65.0	74	-9.0	PEAK
7205.4000	58.6	45	1.2	V	36.3	4.3	34.7	64.5	74	-9.5	PEAK
9607.2	54.8	0	2.5	H	38.4	5.5	34.2	64.5	74	-9.5	PEAK
7205.4000	37.2	45	1.2	V	36.3	4.3	34.7	43.1	54	-10.9	AVE
4803.6000	39.6	345	2.0	V	32.5	3.1	34.8	40.4	54	-13.6	AVE
4803.6000	58.8	45	2.0	H	32.5	3.1	34.8	59.6	74	-14.4	PEAK
7205.4000	31.0	0	3.1	H	36.3	4.3	34.7	36.9	54	-17.1	AVE
4803.6000	33.8	45	2.0	H	32.5	3.1	34.8	34.6	54	-19.4	AVE
7205.4000	45.2	0	3.1	H	36.3	4.3	34.7	51.1	74	-22.9	PEAK
Middle Channel, 2441 MHz											
2440.1580	119.5	330	2.4	V	28.1	0.9	35.8	112.7			FUND/PEAK
2440.1580	120.3	0	3.0	H	28.1	0.9	35.8	113.5			FUND/PEAK
4880.3160	72.6	0	1.5	H	32.5	3.1	34.8	73.4	74	-0.6	PEAK
12200.80	60.30	180	1.4	V	39.6	5.3	32.0	73.2	74	-0.8	PEAK
4880.3160	72.0	0	3.2	V	32.5	3.1	34.8	72.8	74	-1.2	PEAK
12200.80	37.20	180	1.4	V	39.6	5.3	32.0	50.1	54	-3.9	AVE
12200.80	54.80	45	3.0	H	39.6	5.3	32.0	67.7	74	-6.3	PEAK
12200.80	34.50	45	3.0	H	39.6	5.3	32.0	47.4	54	-6.6	AVE
9760.64	57.70	180	1.5	V	38.4	5.5	34.2	67.4	74	-6.6	PEAK
9760.64	56.70	45	1.2	H	38.4	5.5	34.2	66.4	74	-7.6	PEAK
9760.64	36.50	180	1.5	V	38.4	5.5	34.2	46.2	54	-7.8	AVE
9760.64	36.20	45	1.2	H	38.4	5.5	34.2	45.9	54	-8.1	AVE
7320.4740	37.5	0	1.5	H	36.3	4.3	34.7	43.4	54	-10.6	AVE
7320.4740	37.3	180	2.0	V	36.3	4.3	34.7	43.2	54	-10.8	AVE
7320.4740	56.0	180	2.0	V	36.3	4.3	34.7	61.9	74	-12.1	PEAK
7320.4740	55.6	0	1.5	H	36.3	4.3	34.7	61.5	74	-12.5	PEAK
4880.3160	40.1	0	1.5	H	32.5	3.1	34.8	40.9	54	-13.1	AVE
4880.3160	39.8	0	3.2	V	32.5	3.1	34.8	40.6	54	-13.4	AVE

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV	Degree	Meter	H/V	dB/m	dB	dB	dBμV/m	dBμV/m	dB	
High Channel, 2479.4 MHz											
2479.4000	119.2	330	1.5	V	28.1	0.9	35.8	112.4			FUND/PEAK
2479.4000	118.4	0	2.8	H	28.1	0.9	35.8	111.6			FUND/PEAK
4958.8000	69.2	0	2.6	H	32.5	3.1	34.8	70.0	74	-4.0	PEAK
4958.8000	67.1	100	2.8	V	32.5	3.1	34.8	67.9	74	-6.1	PEAK
9917.88	57.40	200	1.2	V	38.4	5.5	34.2	67.1	74	-6.9	PEAK
9917.88	37.00	200	1.2	V	38.4	5.5	34.2	46.7	54	-7.3	AVE
9917.88	36.90	0	3.0	H	38.4	5.5	34.2	46.6	54	-7.4	AVE
9917.88	56.10	0	3.0	H	38.4	5.5	34.2	65.8	74	-8.2	PEAK
7438.2000	37.7	0	2.7	V	36.3	4.3	34.7	43.6	54	-10.4	AVE
7438.2000	57.5	0	2.7	V	36.3	4.3	34.7	63.4	74	-10.6	PEAK
7438.2000	37.3	0	1.5	H	36.3	4.3	34.7	43.2	54	-10.8	AVE
7438.2000	55.7	0	1.5	H	36.3	4.3	34.7	61.6	74	-12.4	PEAK
4958.8000	39.4	0	2.6	H	32.5	3.1	34.8	40.2	54	-13.8	AVE
4958.8000	38.6	100	2.8	V	32.5	3.1	34.8	39.4	54	-14.6	AVE

Note:

FUND: Fundamental
AVE: Average
The EUT was tested with fresh battery and tested in three orthogonal planes.

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV	Degree	Meter	H/V	dB/m	dBm	dB	dBμV/m	dBμV/m	dB
878.60	37.10	350	3.0	V	22.4	3.8	28.5	34.8	46	-8.9, Peak
446.67	34.00	45	1.7	H	16.9	2.9	28.5	25.3	46	-23.6, Peak
136.37	34.80	350	1.8	V	12.2	1.6	28.5	20.1	43	-28.3, Peak

3 Meters Radiated Emission Test Data, Base

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV	Degree	Meter	H/V	dB/m	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel, 2401.8 MHz											
2401.8000	114.0	0	2.2	V	28.1	0.9	35.8	107.2			FUND/PEAK
2401.8000	111.0	0	1.5	H	28.1	0.9	35.8	104.2			FUND/PEAK
9606.91	62.33	315	2.0	V	38.4	5.5	34.2	72.1	74	-1.9	PEAK
4803.6000	69.8	0	2.3	V	32.5	3.1	34.8	70.6	74	-3.4	PEAK
4803.6000	68.3	225	3.2	H	32.5	3.1	34.8	69.1	74	-4.9	PEAK
7205.4000	62.7	90	3.5	V	36.3	4.3	34.7	68.6	74	-5.4	PEAK
9606.91	58.67	0	3.0	H	38.4	5.5	34.2	68.4	74	-5.6	PEAK
9606.91	36.33	0	3.0	H	38.4	5.5	34.2	46.1	54	-7.9	AVE
9606.91	36.00	315	2.0	V	38.4	5.5	34.2	45.7	54	-8.3	AVE
7205.4000	35.2	90	3.5	V	36.3	4.3	34.7	41.1	54	-12.9	AVE
4803.6000	39.8	120	2.3	V	32.5	3.1	34.8	40.6	54	-13.4	AVE
7205.4000	54.7	110	4.0	H	36.3	4.3	34.7	60.6	74	-13.4	PEAK
7205.4000	34.0	110	4.0	H	36.3	4.3	34.7	39.9	54	-14.1	AVE
4803.6000	38.0	45	3.2	H	32.5	3.1	34.8	38.8	54	-15.2	AVE
Middle Channel, 2441 MHz											
2440.1580	108.5	90	3.2	V	28.1	0.9	35.8	101.7			FUND/PEAK
2440.1580	106.5	180	3.0	H	28.1	0.9	35.8	99.7			FUND/PEAK
4880.3160	69.8	330	3.0	V	32.5	3.1	34.8	70.6	74	-3.4	PEAK
4880.3160	66.8	45	3.5	H	32.5	3.1	34.8	67.6	74	-6.4	PEAK
9760.25	56.33	120	1.5	V	38.4	5.5	34.2	66.1	74	-7.9	PEAK
7320.4740	58.8	90	3.2	V	36.3	4.3	34.7	64.8	74	-9.2	PEAK
9760.25	55.00	270	3.7	H	38.4	5.5	34.2	64.7	74	-9.3	PEAK
9760.25	33.17	120	1.5	V	38.4	5.5	34.2	42.9	54	-11.1	AVE
9760.25	33.17	270	3.7	H	38.4	5.5	34.2	42.9	54	-11.1	AVE
7320.4740	34.8	90	3.2	V	36.3	4.3	34.7	40.8	54	-13.2	AVE
4880.3160	39.7	330	3.0	V	32.5	3.1	34.8	40.4	54	-13.6	AVE
4880.3160	39.0	0	3.5	H	32.5	3.1	34.8	39.8	54	-14.2	AVE
7320.4740	33.7	315	3.6	H	36.3	4.3	34.7	39.6	54	-14.4	AVE
7320.4740	49.3	315	3.6	H	36.3	4.3	34.7	55.3	74	-18.7	PEAK

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV	Degree	Meter	H/V	dB/m	dB	dB	dBμV/m	dBμV/m	dB	
High Channel, 2479.4 MHz											
2479.4000	113.8	90	3.0	V	28.1	0.9	35.8	107.0			FUND/PEAK
2479.4000	109.6	180	3.0	H	28.1	0.9	35.8	102.8			FUND/PEAK
4958.8000	67.5	0	1.5	H	32.5	3.1	34.8	68.3	74	-5.7	PEAK
4958.8000	67.3	330	3.8	V	32.5	3.1	34.8	68.1	74	-5.9	PEAK
9917.60	57.50	0	3.3	V	38.4	5.5	34.2	67.2	74	-6.8	PEAK
7438.2000	58.0	120	3.1	V	36.3	4.3	34.7	63.9	74	-10.1	PEAK
9917.60	53.83	90	3.0	H	38.4	5.5	34.2	63.6	74	-10.4	PEAK
9917.60	33.50	0	3.3	V	38.4	5.5	34.2	43.2	54	-10.8	AVE
9917.60	33.17	90	3.0	H	38.4	5.5	34.2	42.9	54	-11.1	AVE
7438.2000	35.0	120	3.1	V	36.3	4.3	34.7	40.9	54	-13.1	AVE
4958.8000	39.3	330	3.8	V	32.5	3.1	34.8	40.1	54	-13.9	AVE
4958.8000	38.8	0	1.5	H	32.5	3.1	34.8	39.6	54	-14.4	AVE
7438.2000	32.8	0	1.5	H	36.3	4.3	34.7	38.8	54	-15.2	AVE
7438.2000	50.7	0	1.5	H	36.3	4.3	34.7	56.6	74	-17.4	PEAK

Note:

FUND: Fundamental
AVE: Average

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15.209	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV	Degree	Meter	H/V	dB/m	dBm	dB	dBμV/m	dBμV/m	dB
147.46	56.33	45	2.2	V	12.6	1.7	28.4	42.1	43.5	-1.4, PEAK
331.80	50.23	90	2.5	V	15.8	2.3	28.0	40.4	46	-5.6, PEAK
442.33	45.67	90	2.6	V	16.9	2.9	28.5	36.9	46	-9.1, PEAK
276.48	49.00	100	2.0	V	13.3	2.2	27.9	36.6	46	-9.4, PEAK
221.18	50.17	90	2.2	V	11.8	2.2	28.1	36.0	46	-10.0, PEAK
294.31	47.60	100	2.2	V	13.7	2.3	27.8	35.8	46	-10.2, PEAK
259.20	47.00	300	2.0	V	13.3	2.2	28.0	34.5	46	-11.5, PEAK
304.12	45.19	300	2.3	V	14.4	2.3	27.8	34.1	46	-11.9, PEAK
294.90	45.83	100	1.5	V	13.7	2.3	27.8	34.0	46	-12.0, PEAK
304.13	44.76	300	3.2	V	14.4	2.3	27.8	33.7	46	-12.3, PEAK
331.76	42.60	100	2.5	V	15.8	2.3	28.0	32.8	46	-13.2, PEAK
386.62	42.50	100	2.5	H	15.6	2.4	28.2	32.3	46	-13.7, PEAK

§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	E4448A	Spectrum Analyzer	2004-10-04

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2004-12-04.*

Measurement Results

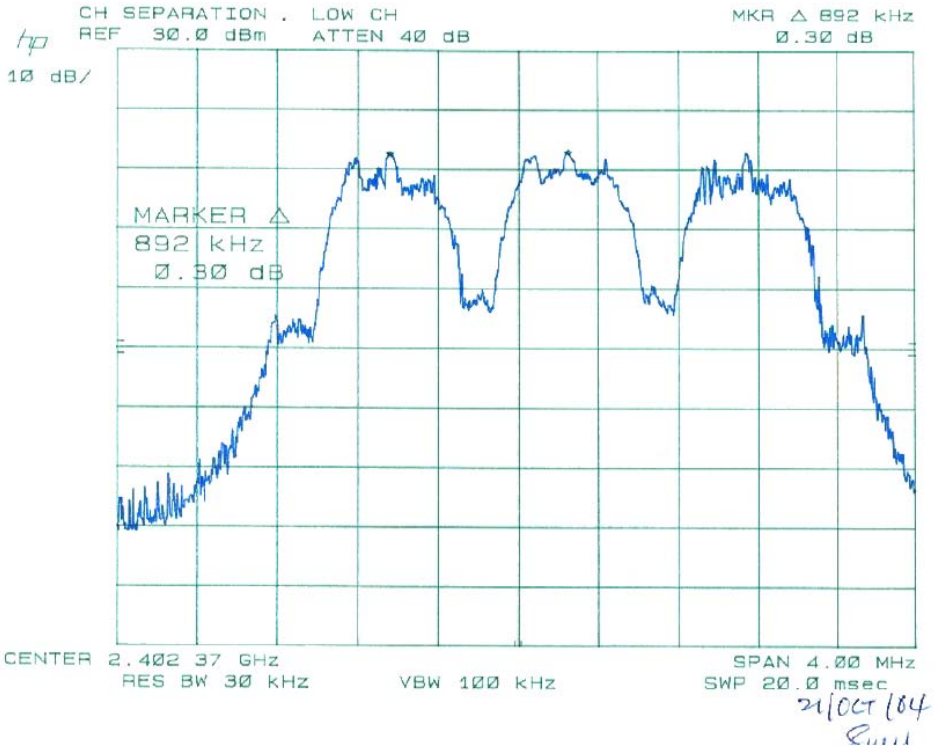
	Channel	Measurement (KHz)	Result
Handset	Low	892	Compliant
	Middle	885	Compliant
	High	888	Compliant

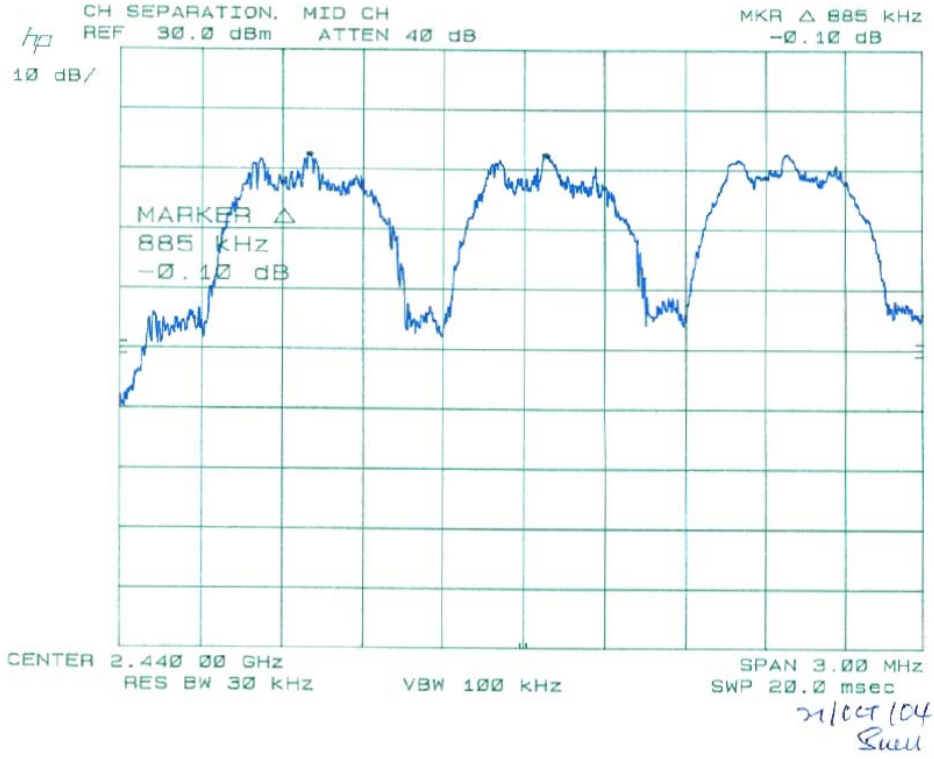
	Channel	Measurement (KHz)	Result
Base	Low	920	Compliant
	Middle	920	Compliant
	High	920	Compliant

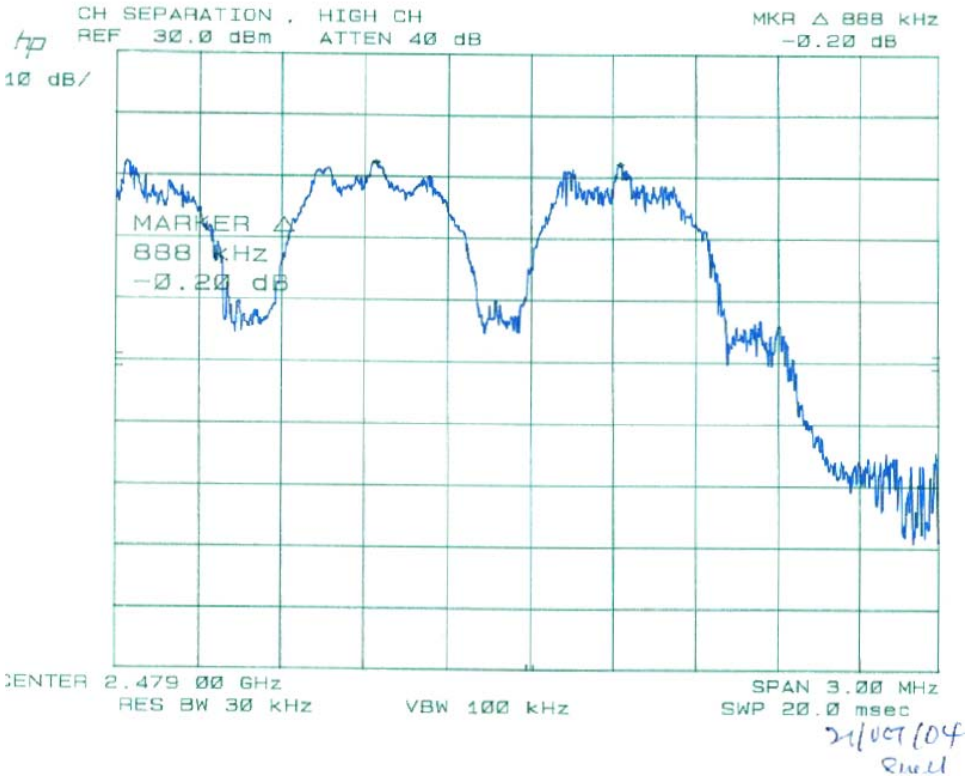
Plots of Hopping Channel Separation

Please refer to the following plots.

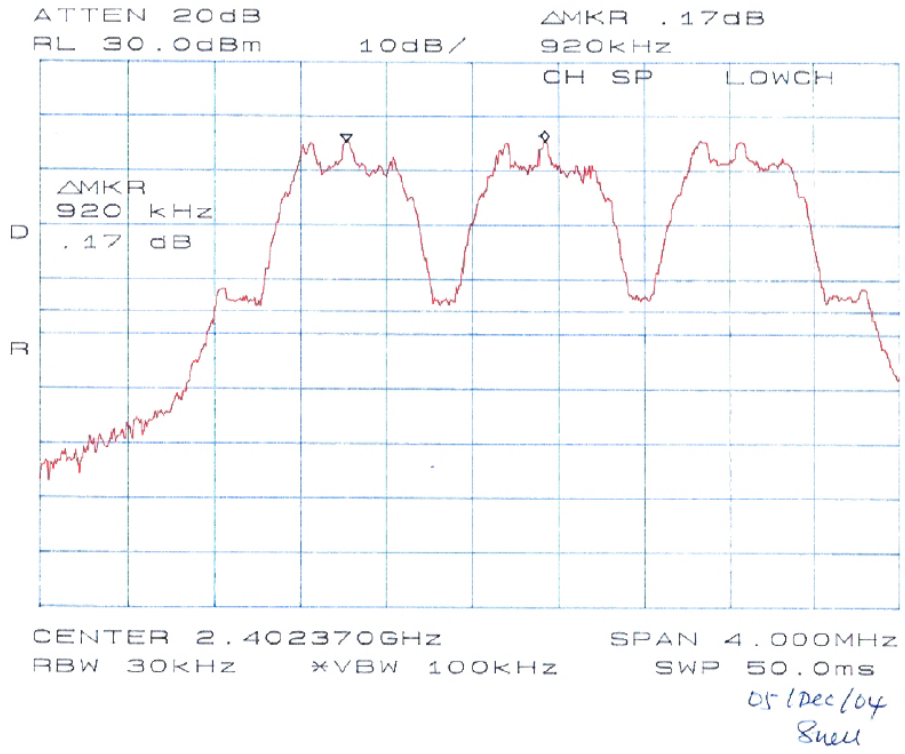
Plots for Handset:

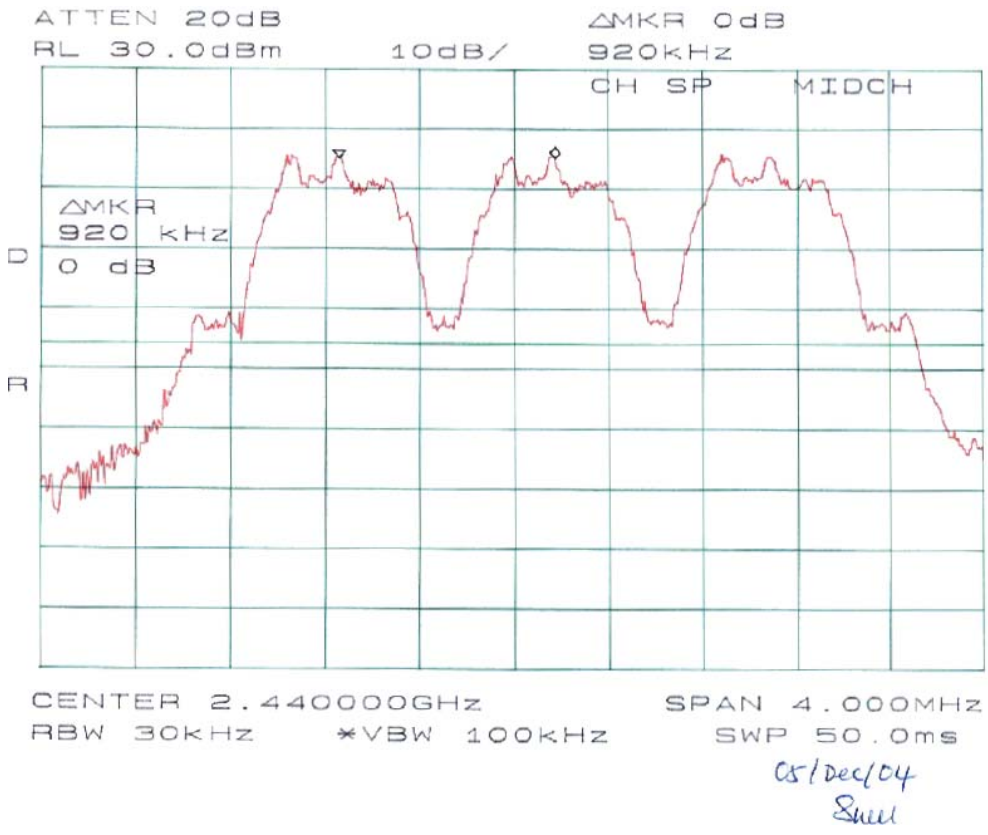


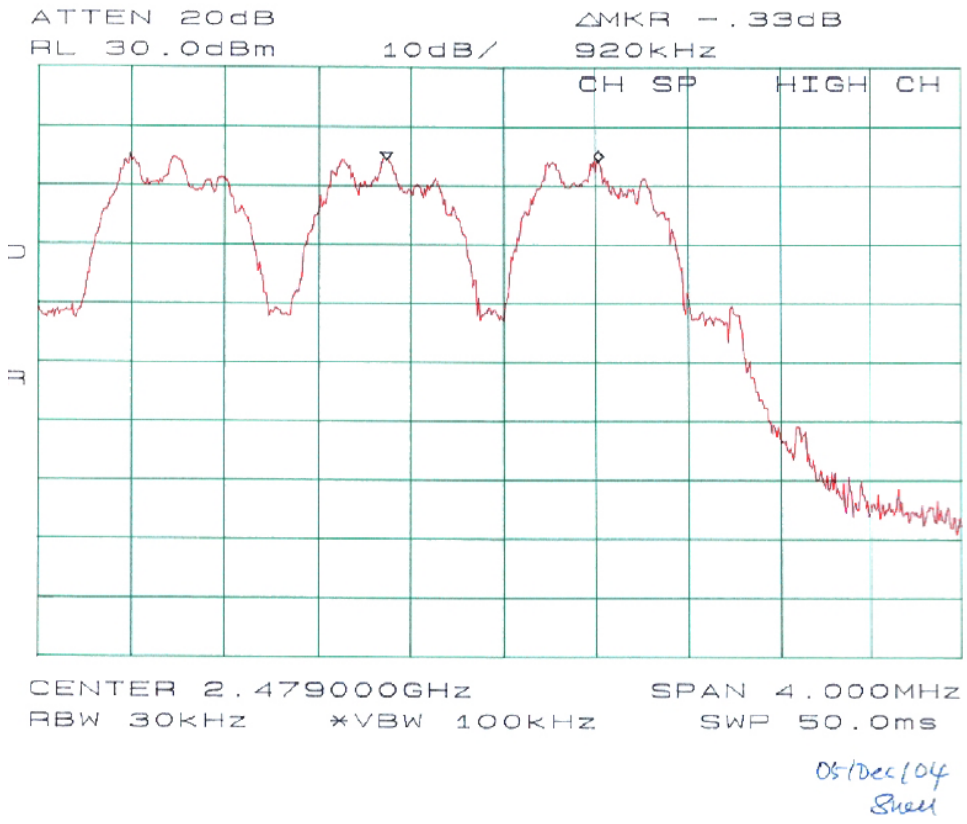




Plots for Base:




ATTEN 20dB
RL 30.0dBm
10dB/
ΔMKR 0dB
920kHz
CH SP MIDCH
ΔMKR
920 kHz
0 dB
CENTER 2.440000GHz
SPAN 4.000MHz
RBW 30kHz
*VBW 100kHz
SWP 50.0ms
05/Dec/04


ATTEN 20dB
RL 30.0dBm
10dB/
ΔMKR -.33dB
920kHz
CH SP HIGH CH
CENTER 2.479000GHz
SPAN 4.000MHz
RBW 30kHz
*VBW 100kHz
SWP 50.0ms
05/Dec/04

§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	E4448A	Spectrum Analyzer	2004-10-04

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2004-11-02 and 2004-12-04.*

Measurement Result

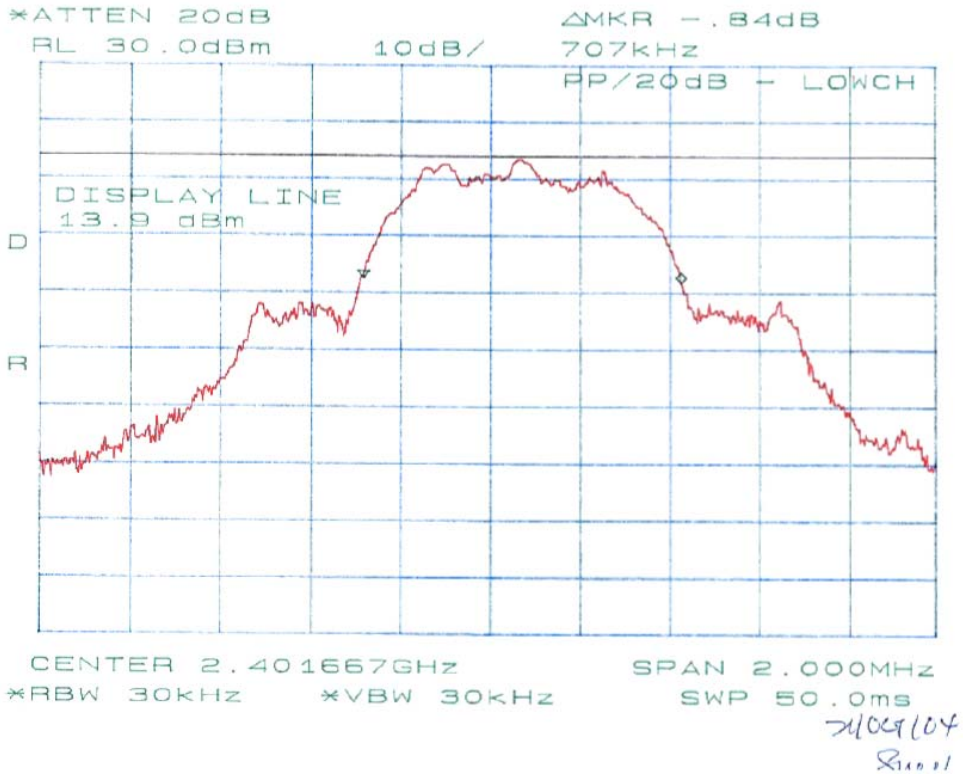
	Frequency	Measurement (kHz)	Standard	Result
Handset	Low	707	≤ 1MHz	Compliant
	Middle	710	≤ 1MHz	Compliant
	High	713	≤ 1MHz	Compliant

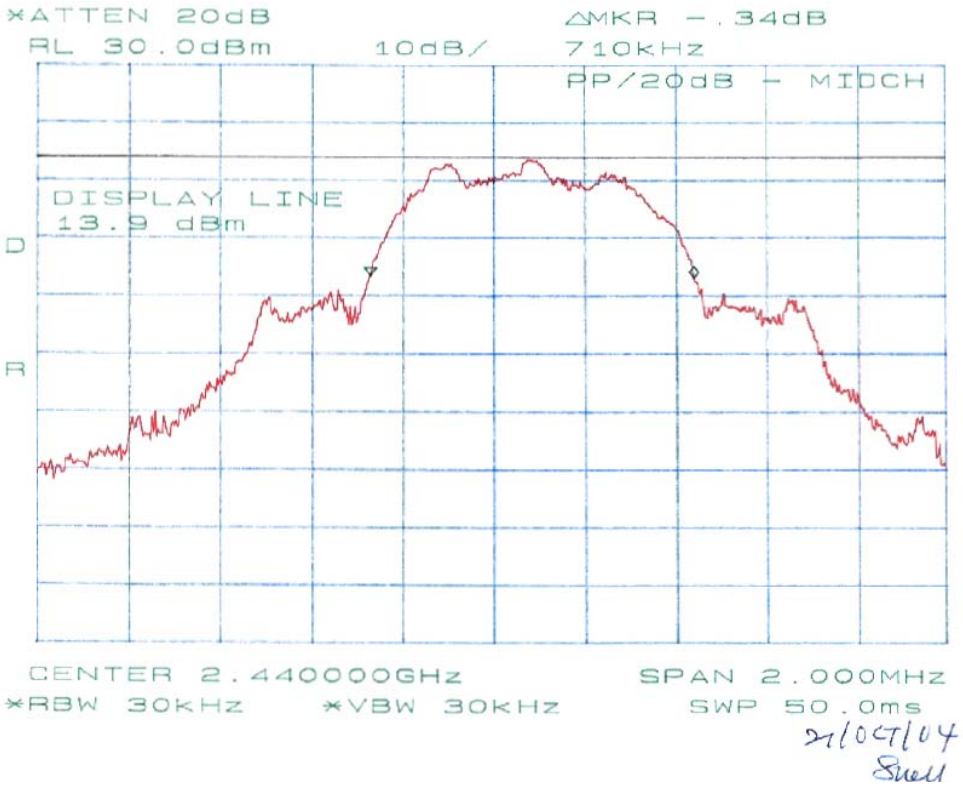
	Frequency	Measurement (kHz)	Standard	Result
Base	Low	690	≤ 1MHz	Compliant
	Middle	697	≤ 1MHz	Compliant
	High	720	≤ 1MHz	Compliant

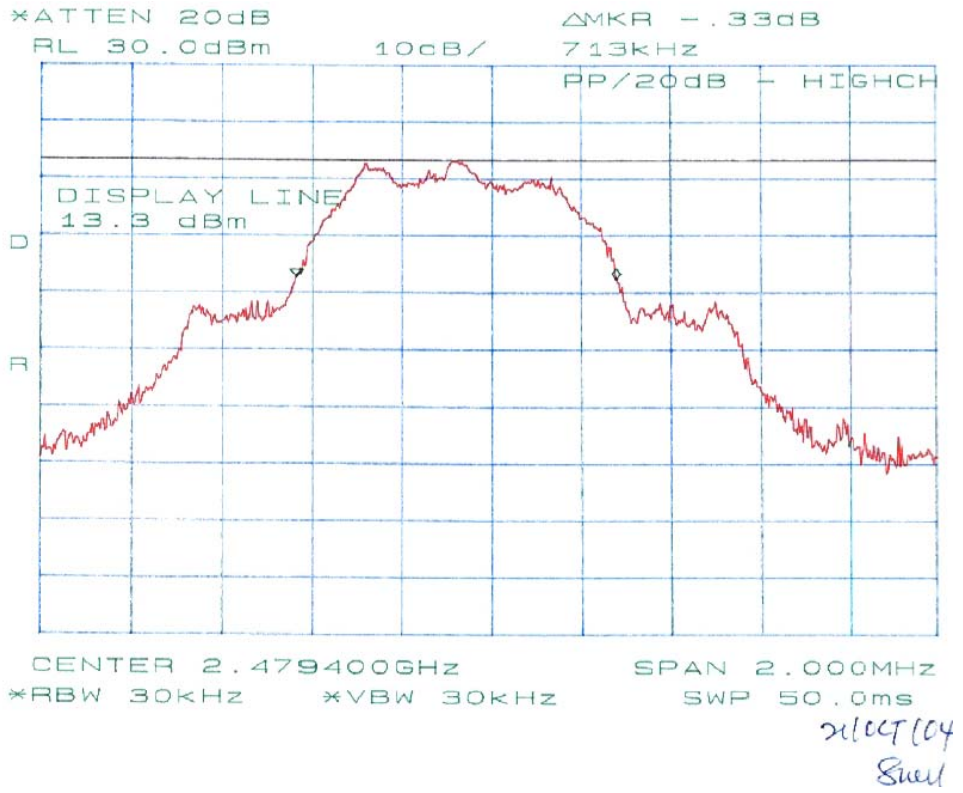
Plot of Channel Bandwidth

Please see the following plots

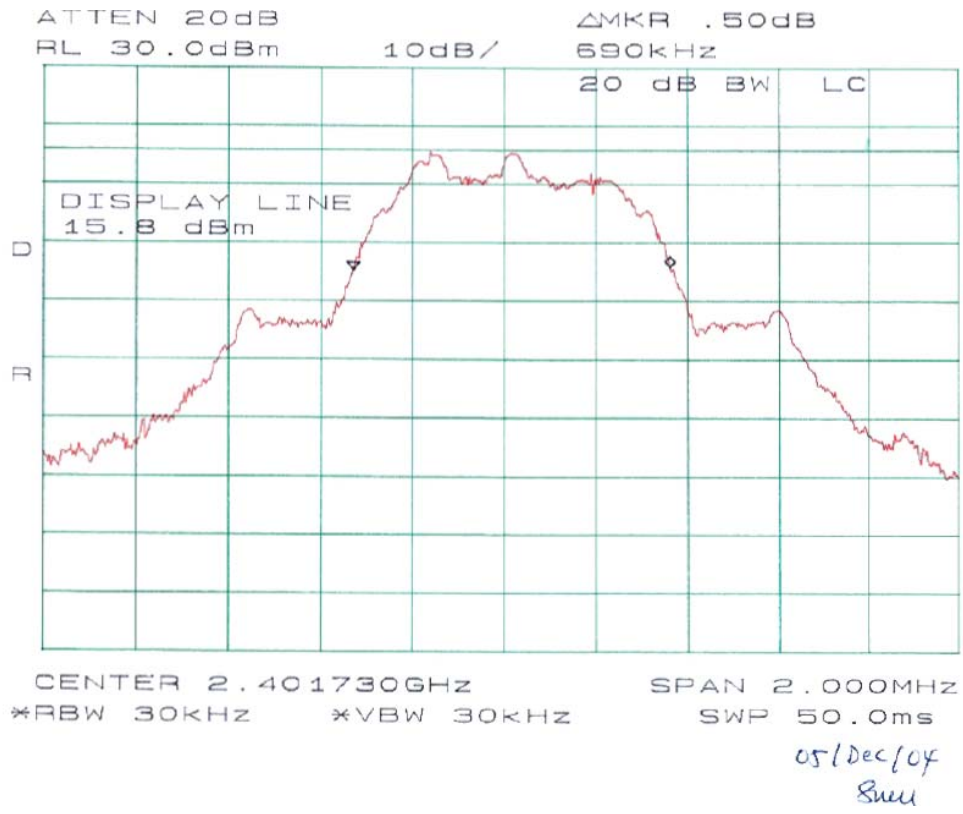
Plots for Handset:

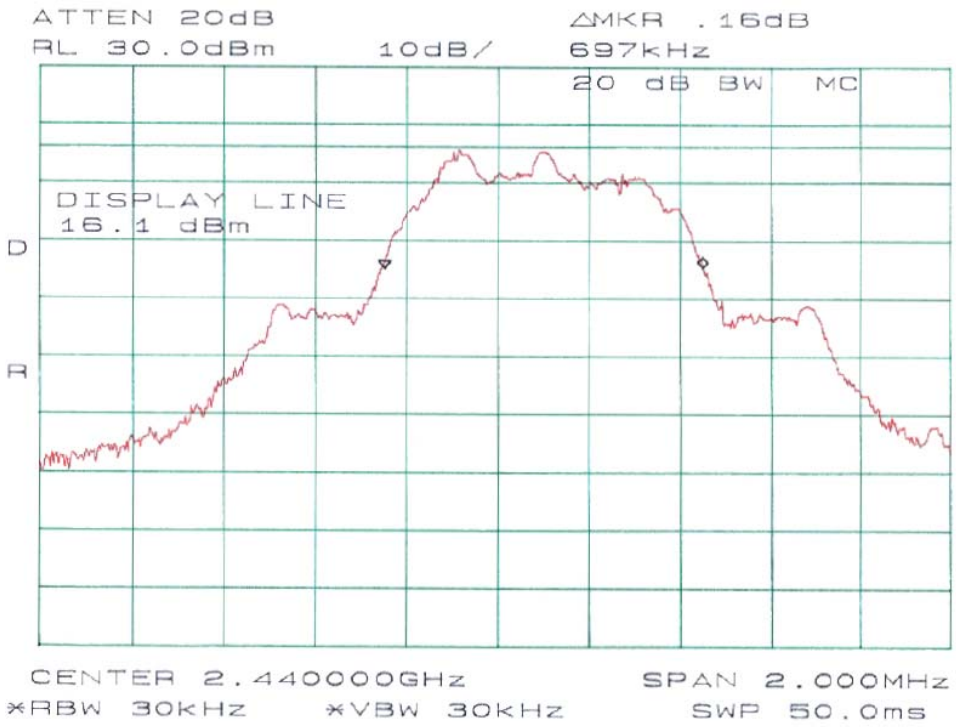




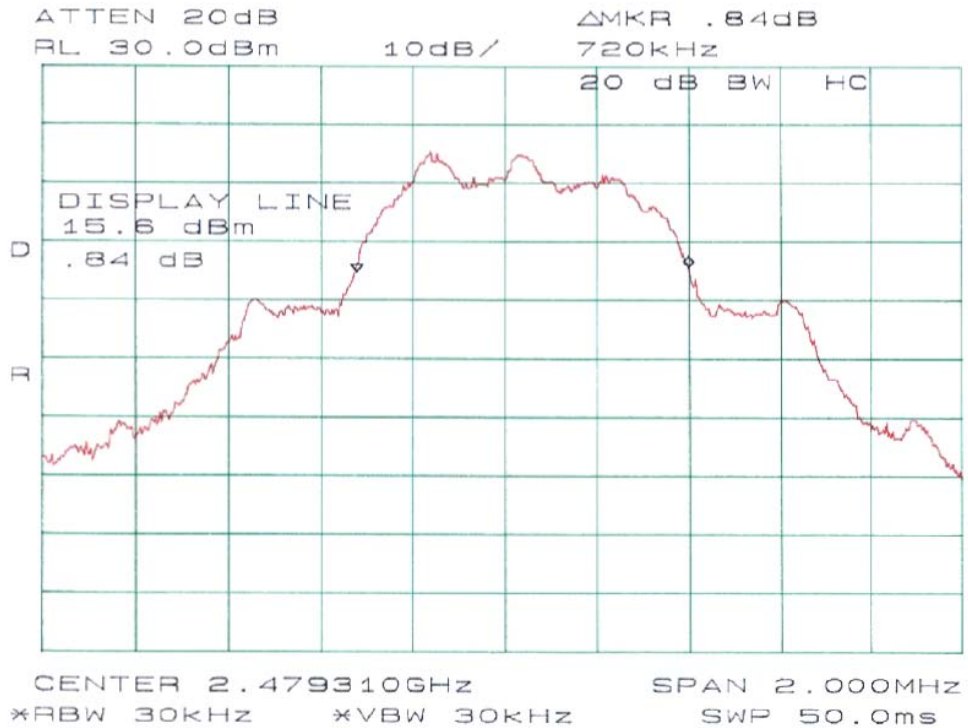


Plots for Base:





05/Dec/04
Snell



05/Dec/04
Snell

§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 15 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	E4448A	Spectrum Analyzer	2004-10-04

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

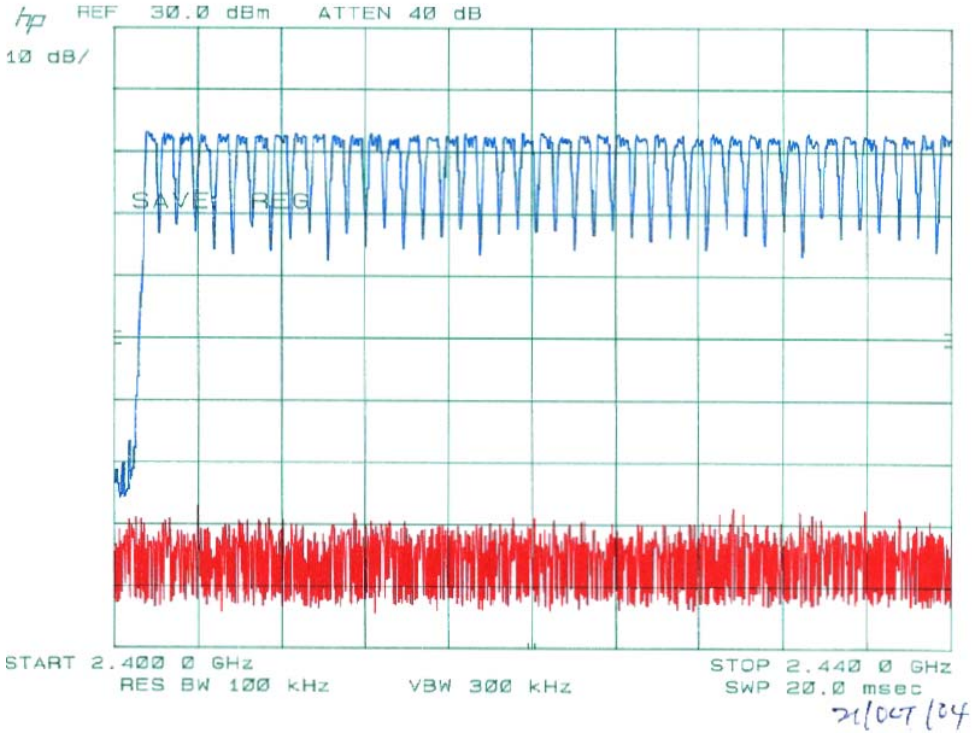
**The testing was performed by Snell Leong on 2004-12-04.*

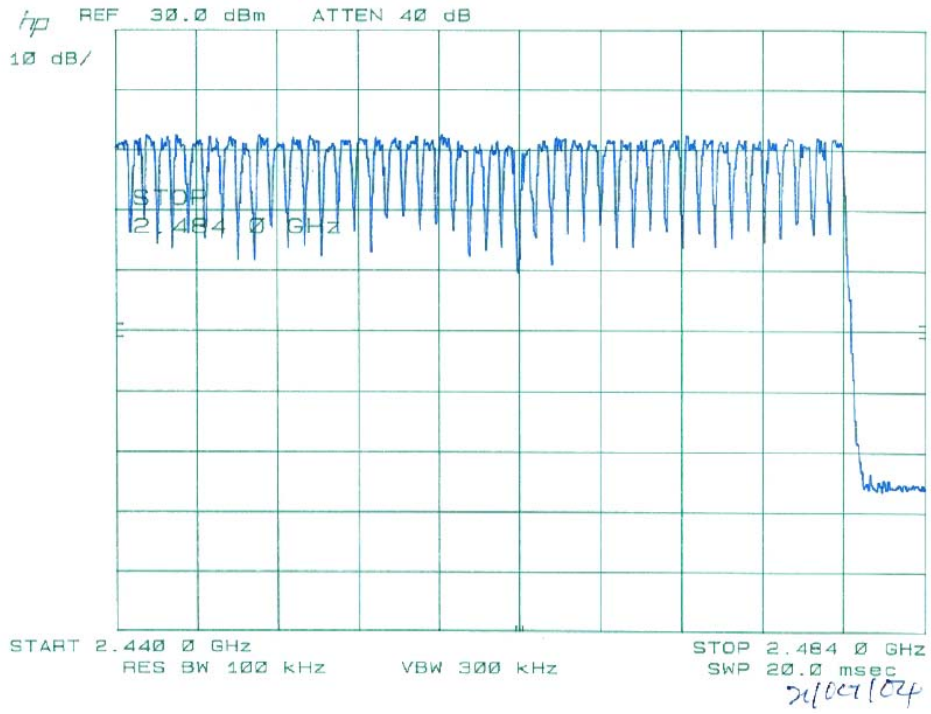
Measurement Results

	Measurement	Standard	Result
Handset	88	15	Compliant
Base	88	15	Compliant

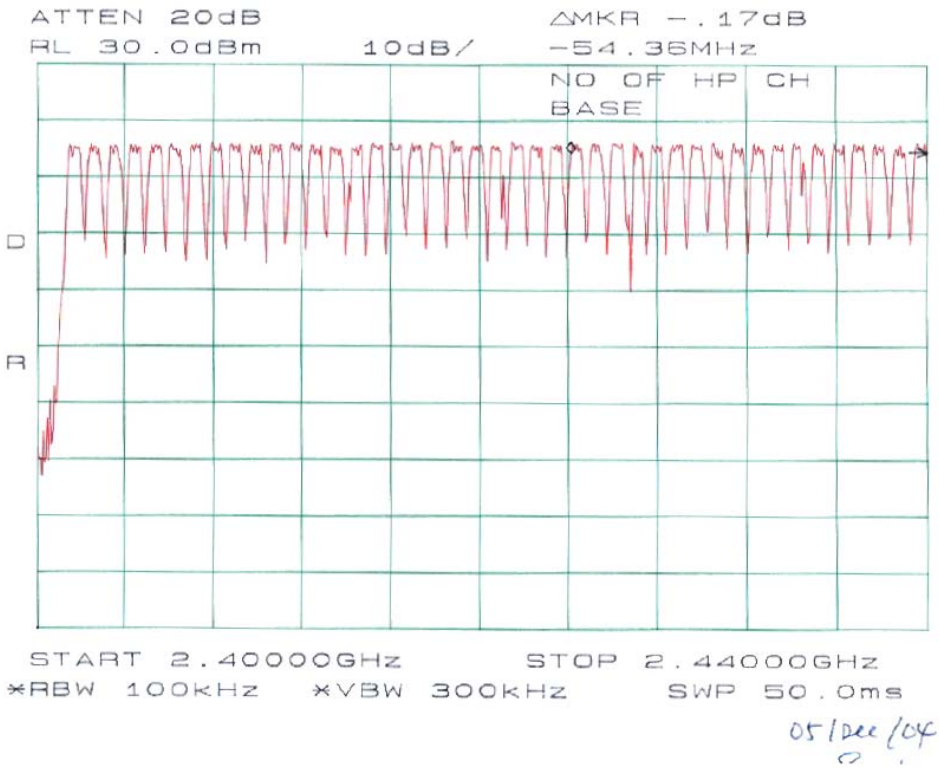
Plots of Number of Hopping Frequency

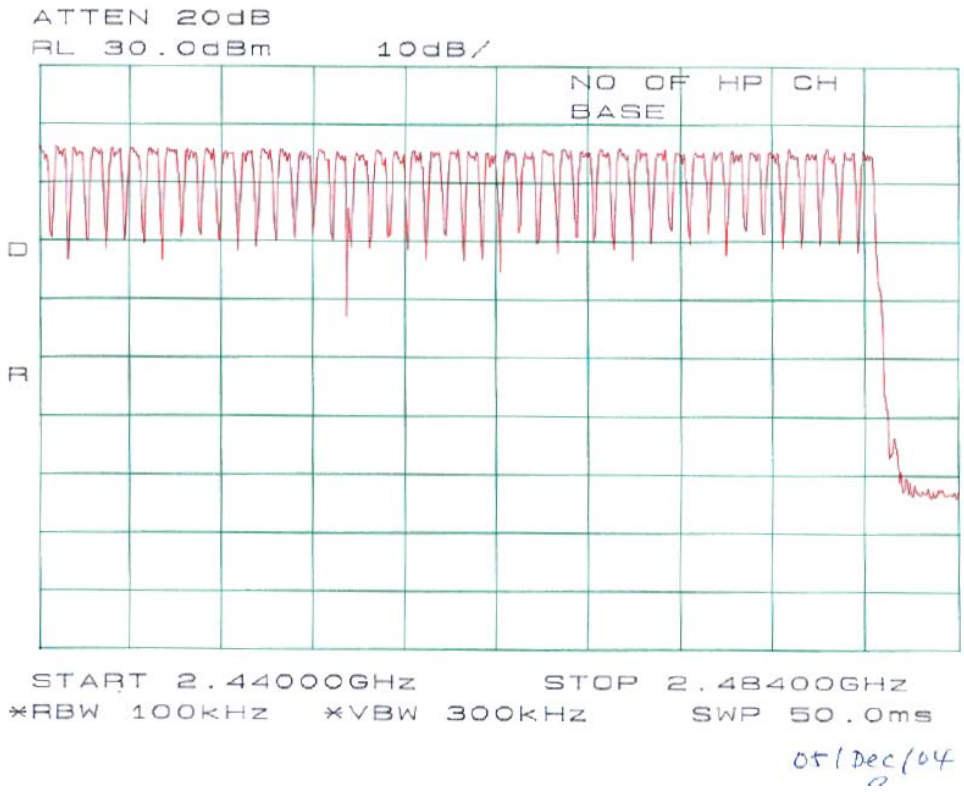
Plots for Handset:





Plots for Base:





§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	E4448A	Spectrum Analyzer	2004-10-04

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2004-12-04.*

Measurement Results

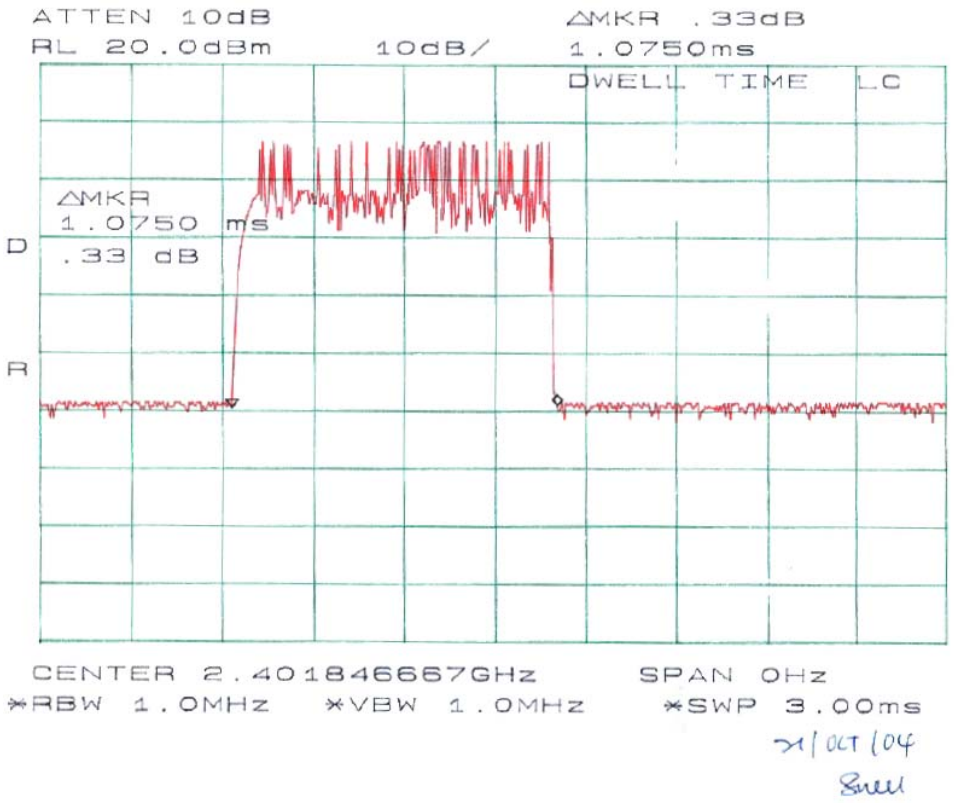
Channel (Handset)	Frequency MHz	Pulse Wide uSec	Occupied time per 35.2 sec	Dwell Time Sec	Limit Sec	Result
Low	2401.8	1075	87	0.093525	0.4	Pass
Mid	2440.16	1065	81	0.086265	0.4	Pass
High	2479.4	1130	87	0.09831	0.4	Pass

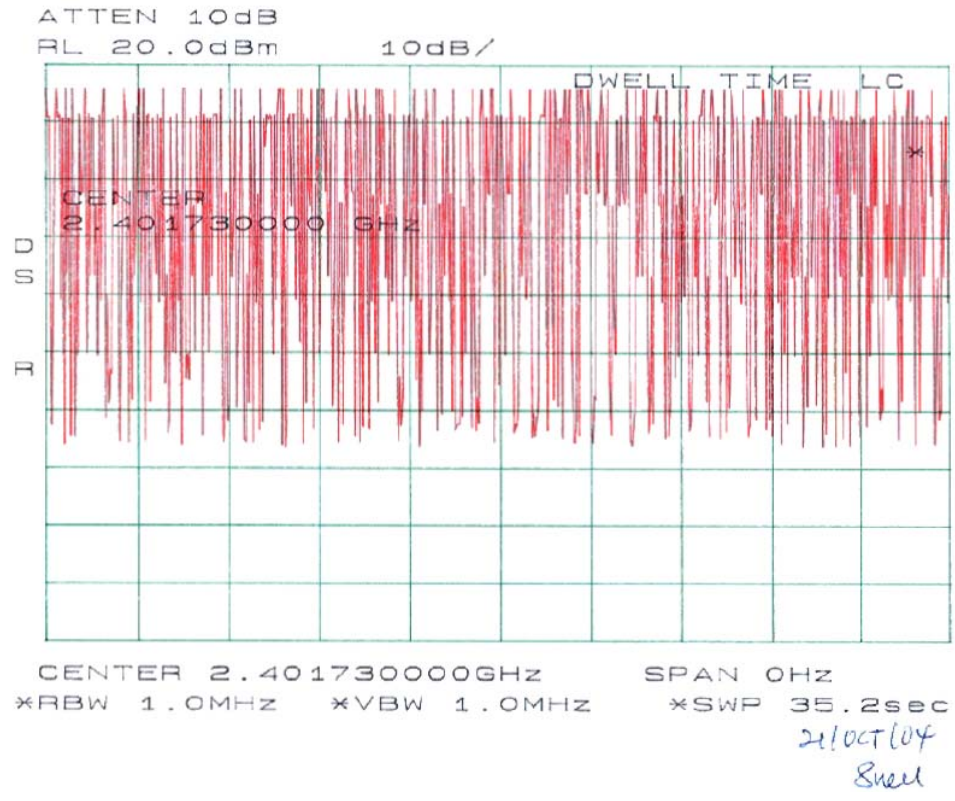
Channel (Base)	Frequency MHz	Pulse Wide uSec	Occupied time per 35.2 sec	Dwell Time Sec	Limit Sec	Result
Low	2401.8	1090	85	0.09265	0.4	Pass
Mid	2440.16	1090	81	0.008829	0.4	Pass
High	2479.4	1070	87	0.09309	0.4	Pass

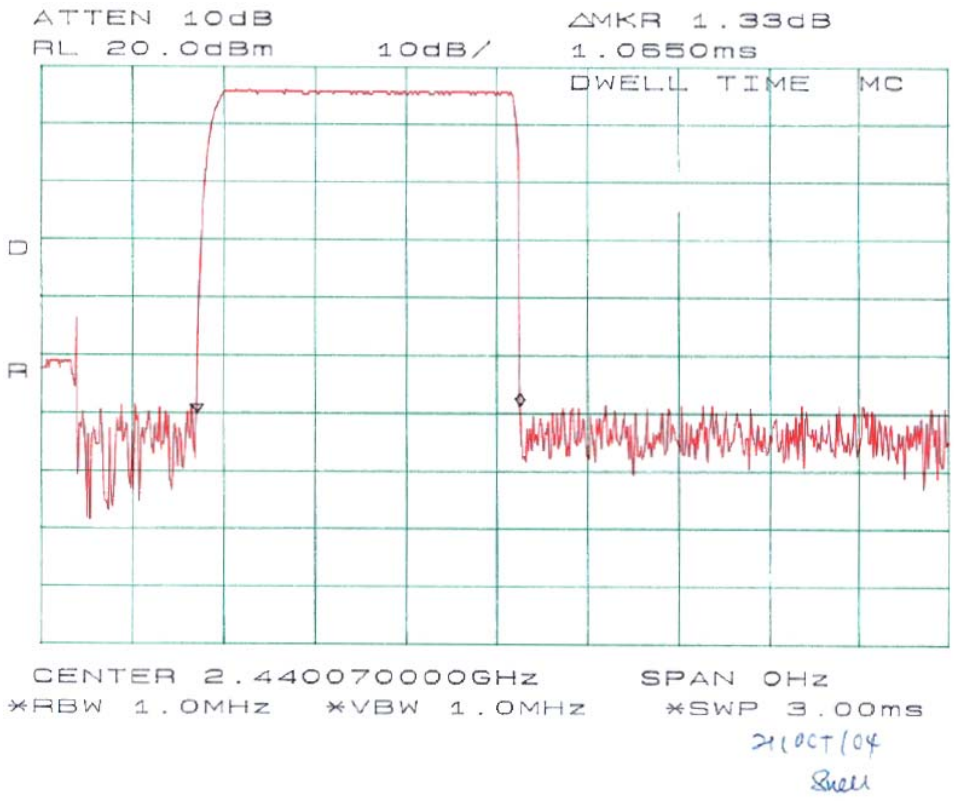
Plots of Dwell Time

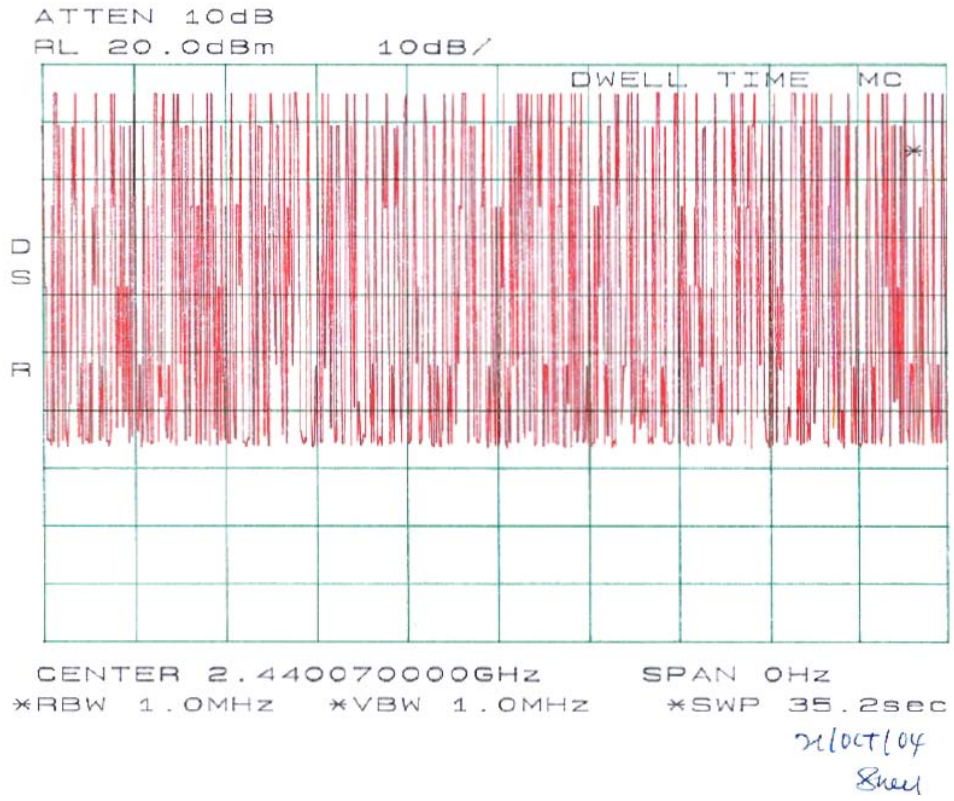
Please refer to the following plots.

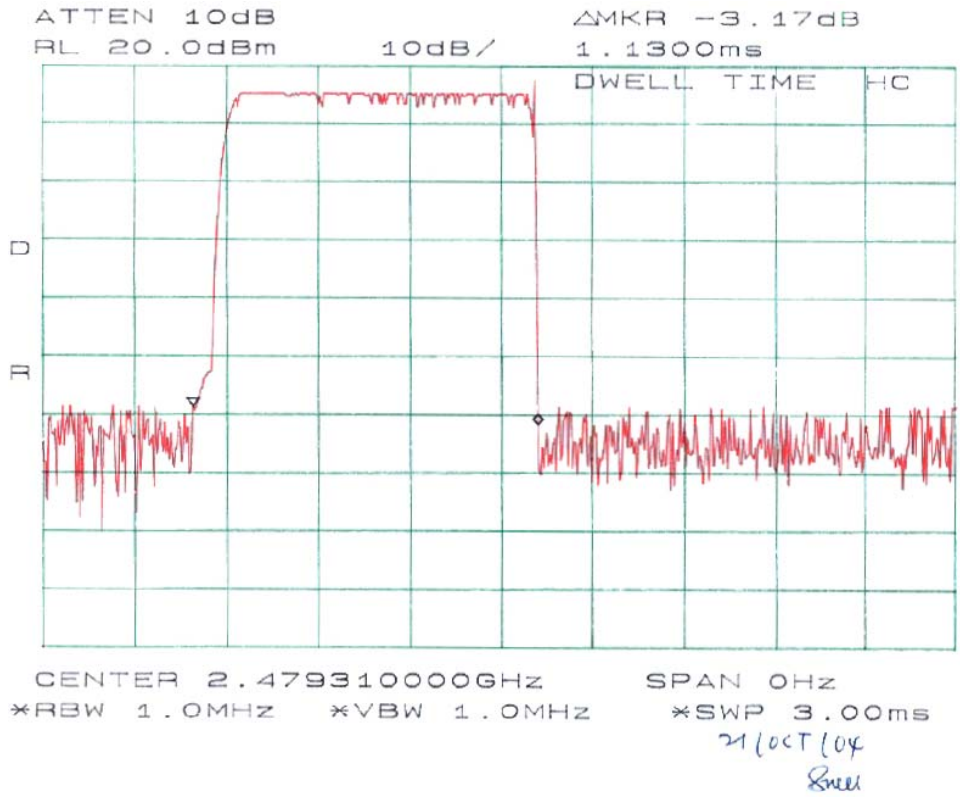
Plots for Handset:

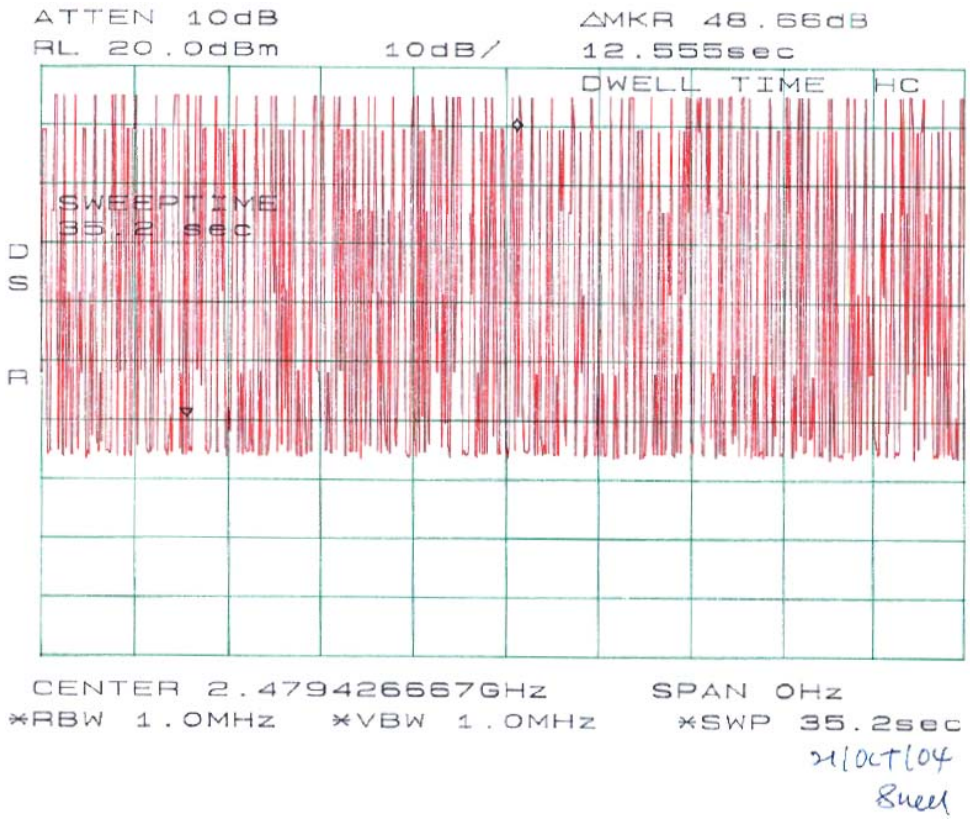




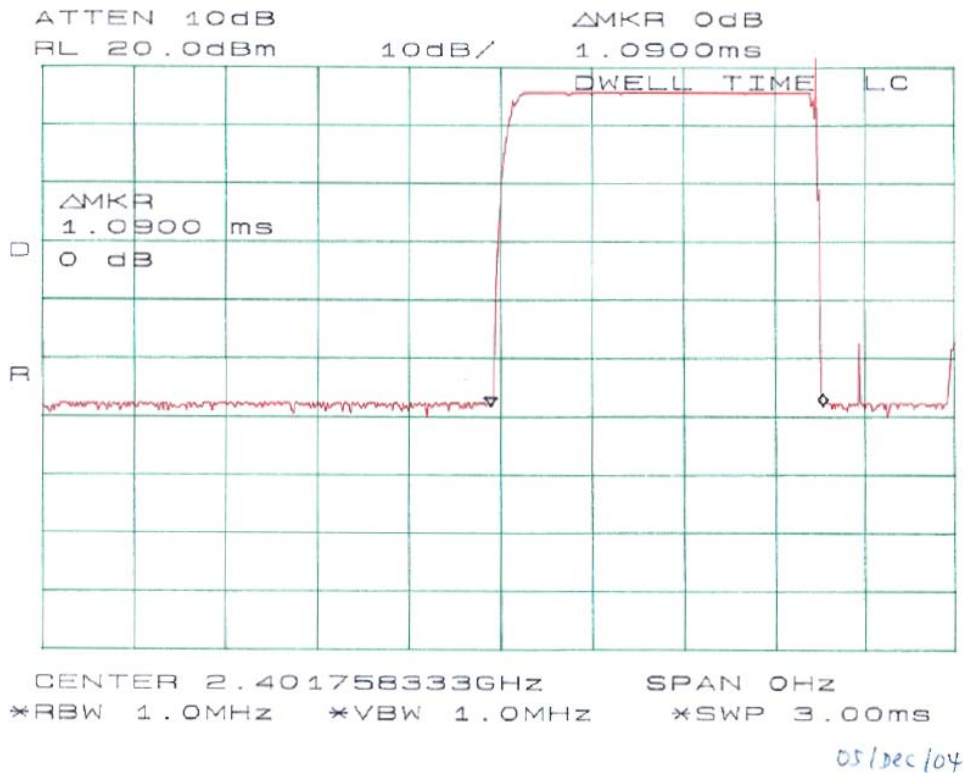

ATTEN 10dB
RL 20.0dBm
10dB/
ΔMKR 1.33dB
1.0650ms
DWELL TIME MC
D
R
CENTER 2.440070000GHz
SPAN 0Hz
*RBW 1.0MHz
*VBW 1.0MHz
*SWP 3.00ms
21 OCT 04
Shell

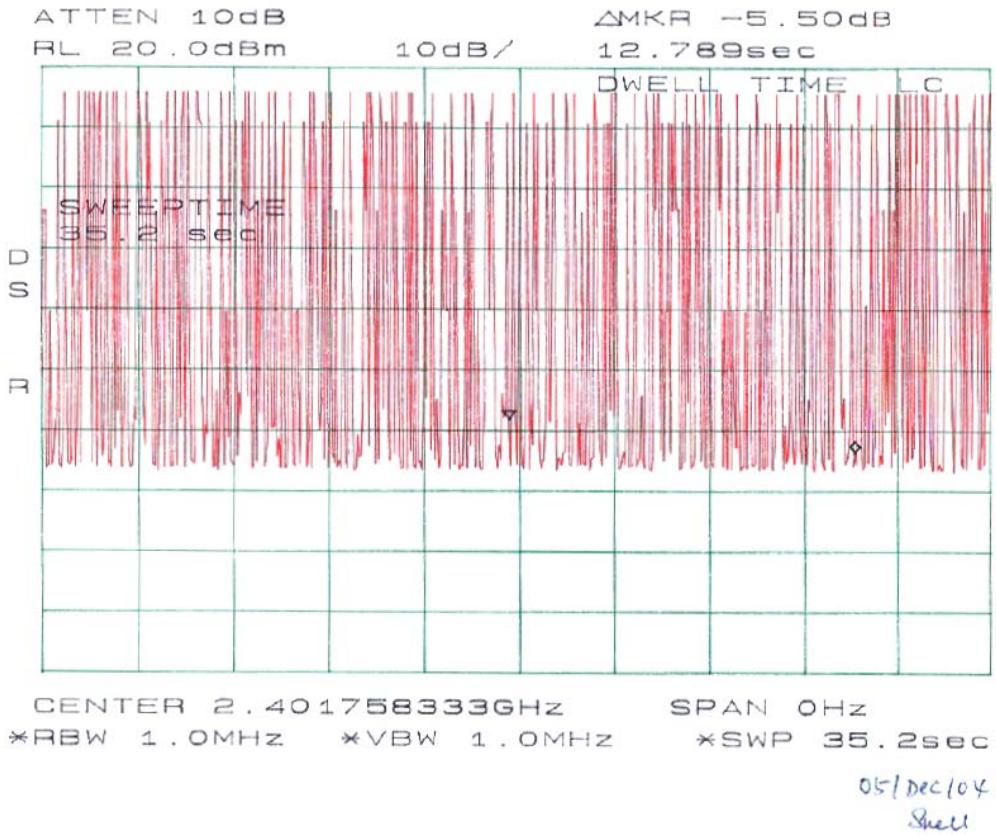

ATTEN 10dB
RL 20.0dBm
10dB/
DWELL TIME MC
D
S
R
CENTER 2.440070000GHz
SPAN 0Hz
*RBW 1.0MHz
*VBW 1.0MHz
*SWP 35.2sec
21/OCT/04
Shell

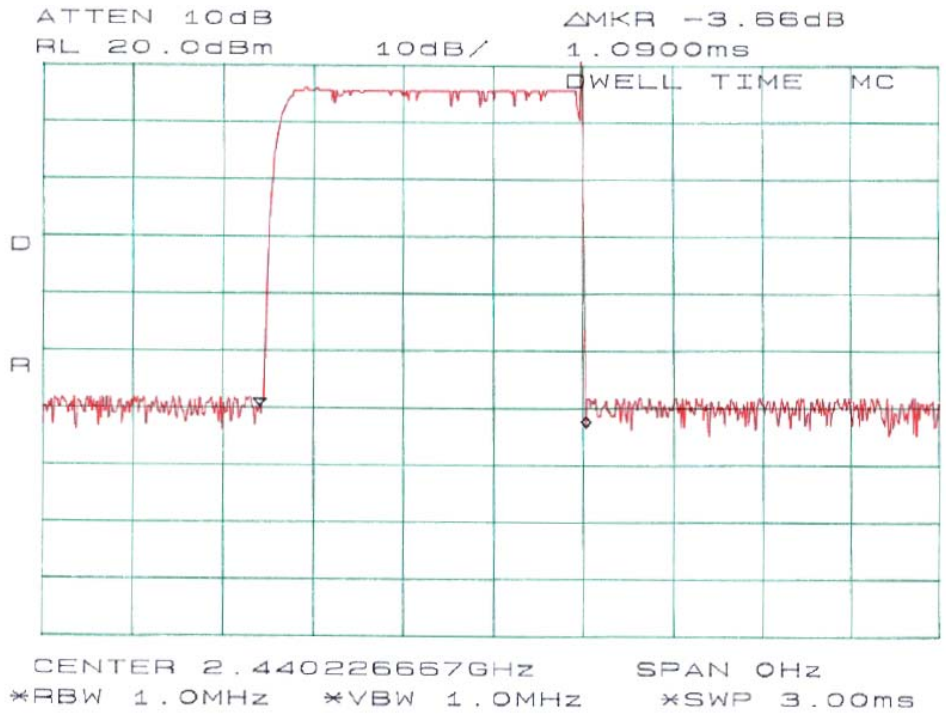

ATTEN 10dB
RL 20.0dBm
10dB/
ΔMKR -3.17dB
1.1300ms
DWELL TIME HC
D
R
CENTER 2.479310000GHz
SPAN 0Hz
*RBW 1.0MHz
*VBW 1.0MHz
*SWP 3.00ms
21 OCT 04
Sneel


ATTEN 10dB
RL 20.0dBm
10dB/
ΔMKR 48.66dB
12.555sec
DWELL TIME HC
SWEEPTIME
35.2 sec
D
S
R
CENTER 2.479426667GHz
SPAN 0Hz
*RBW 1.0MHz
*VBW 1.0MHz
*SWP 35.2sec
21 OCT 04
Sneel

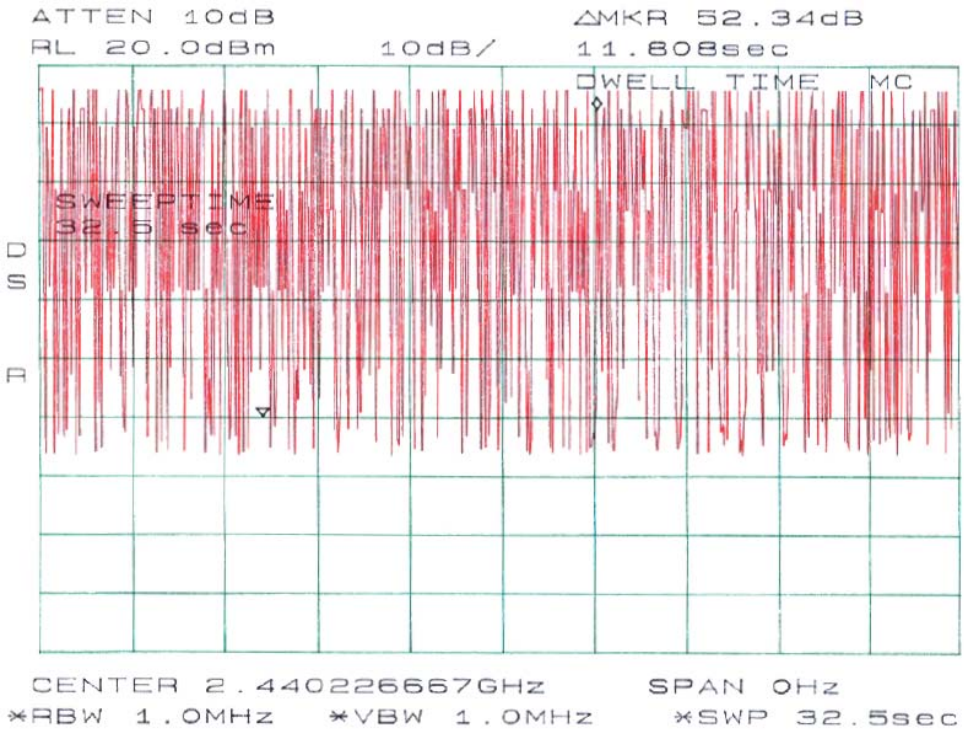
Plots for Base:



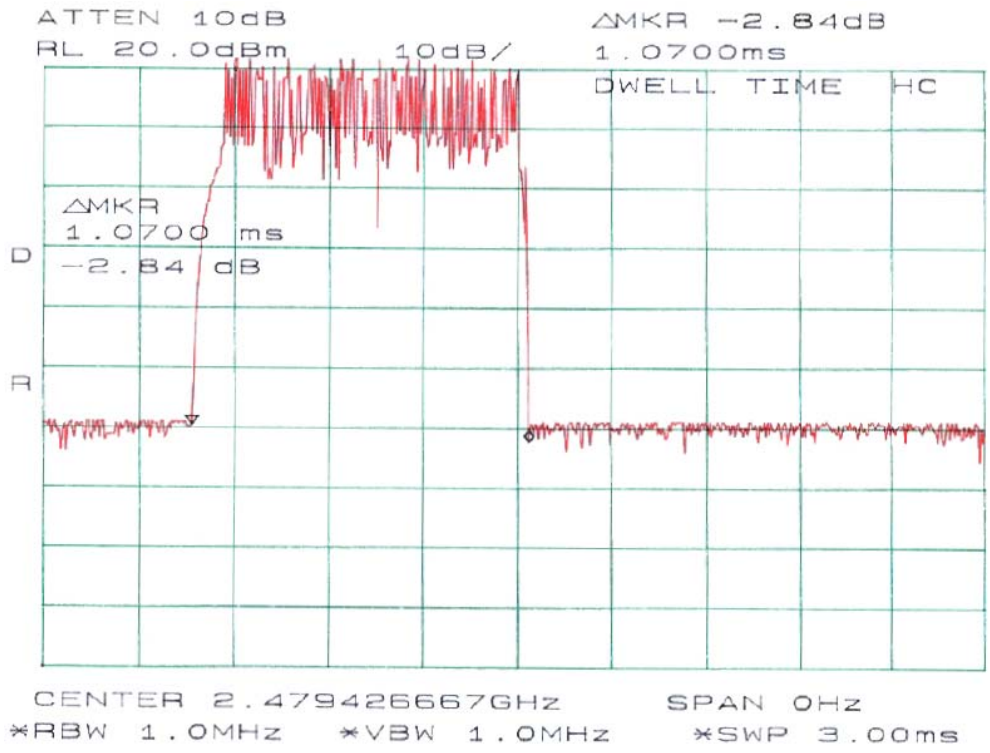




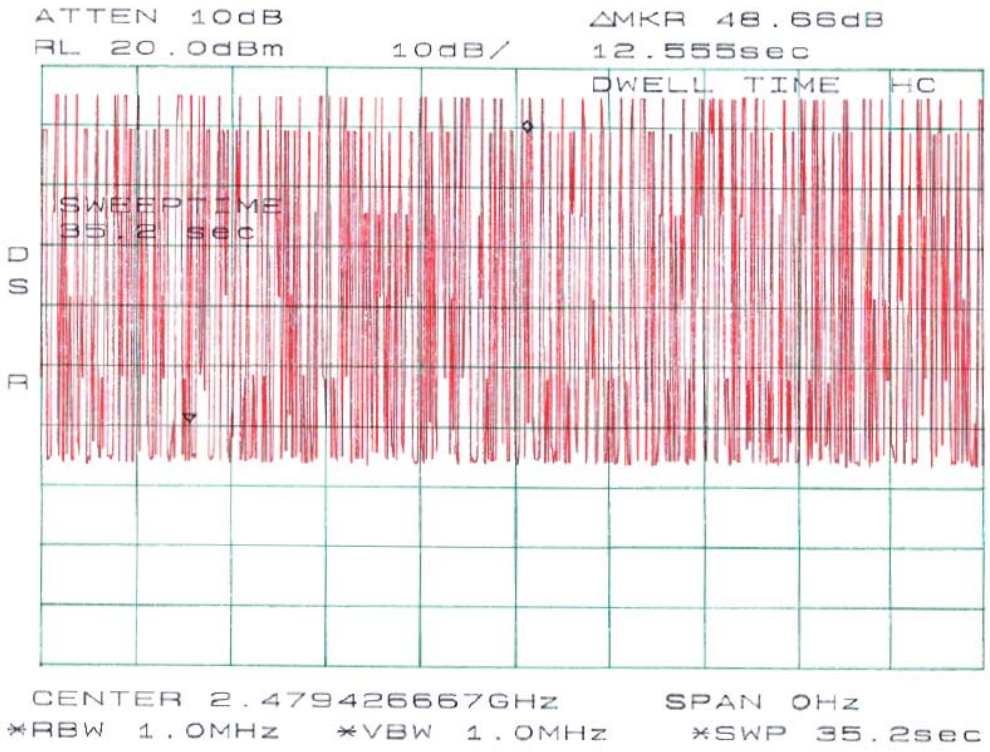
05/Dec/04
Shell



05/Dec/04
Shell



05/Dec/04
Shell



05/Dec/04
Shell

§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	E4448A	Spectrum Analyzer	2004-10-04

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2004-12-04.*

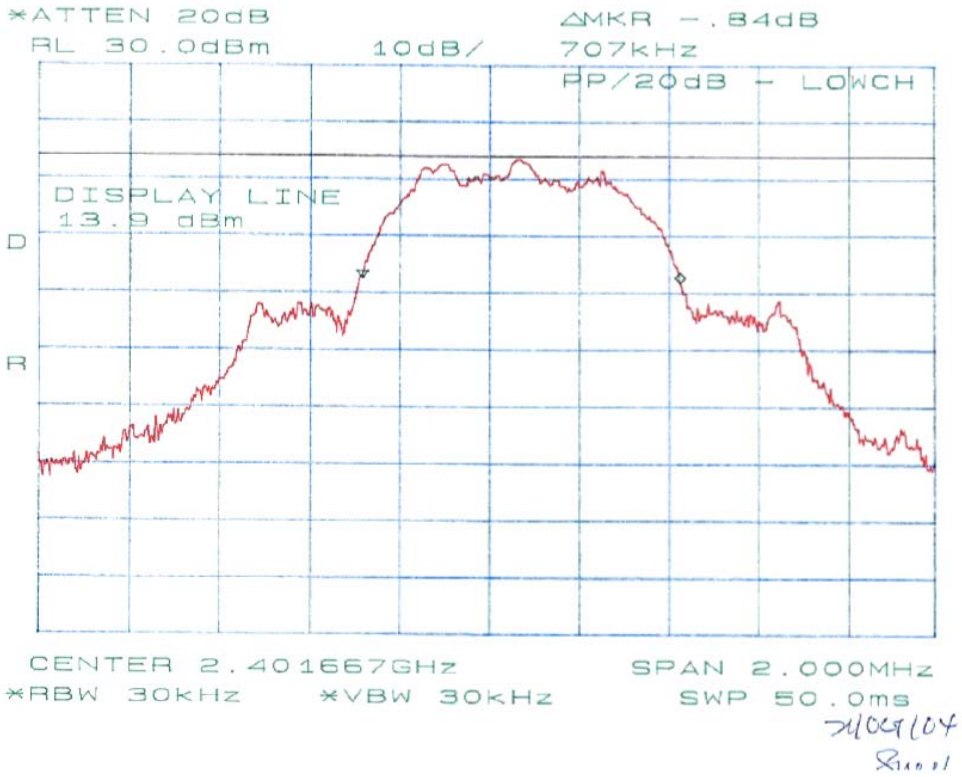
Measurement Result

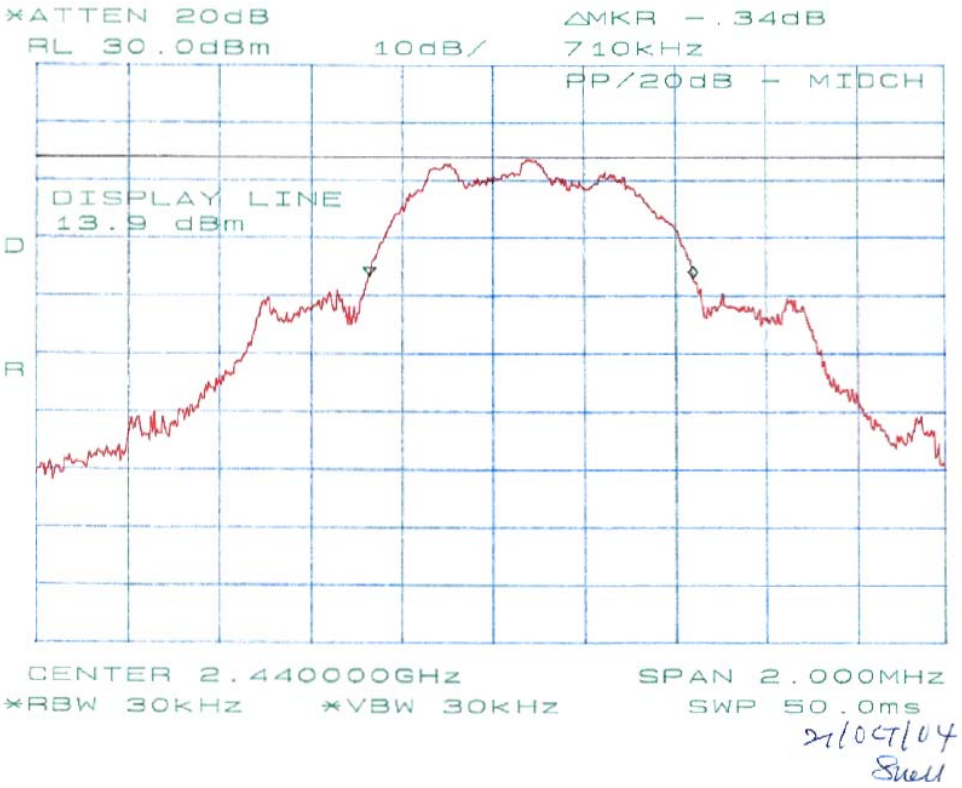
	Channel	Frequency (MHz)	Corrected Output Power (dBm)	(W)	Standard	Result
Handset	Low	2401.8	13.9	0.02455	≤ 1W	Compliant
	Middle	2440.16	13.9	0.02455	≤ 1W	Compliant
	High	2479.4	13.3	0.02138	≤ 1W	Compliant
Base	Low	2401.8	15.8	0.03801	≤ 1W	Compliant
	Middle	2440.16	16.1	0.04074	≤ 1W	Compliant
	High	2479.4	15.6	0.03631	≤ 1W	Compliant

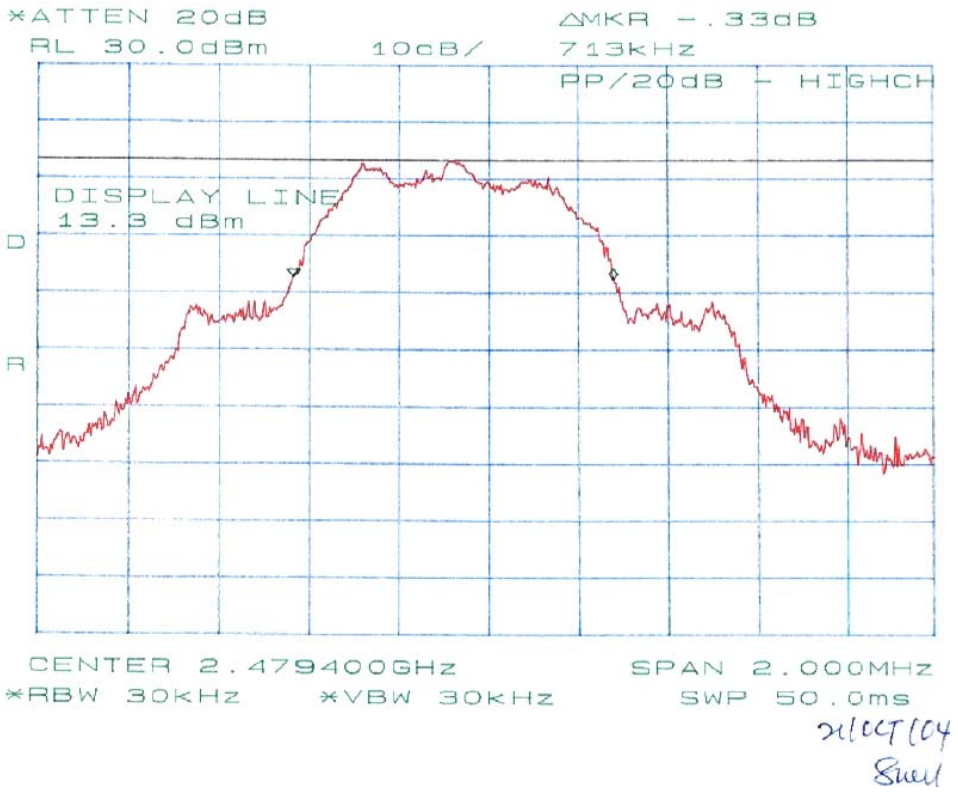
Plots of Maximum Peak Output Power

Please see the following plots

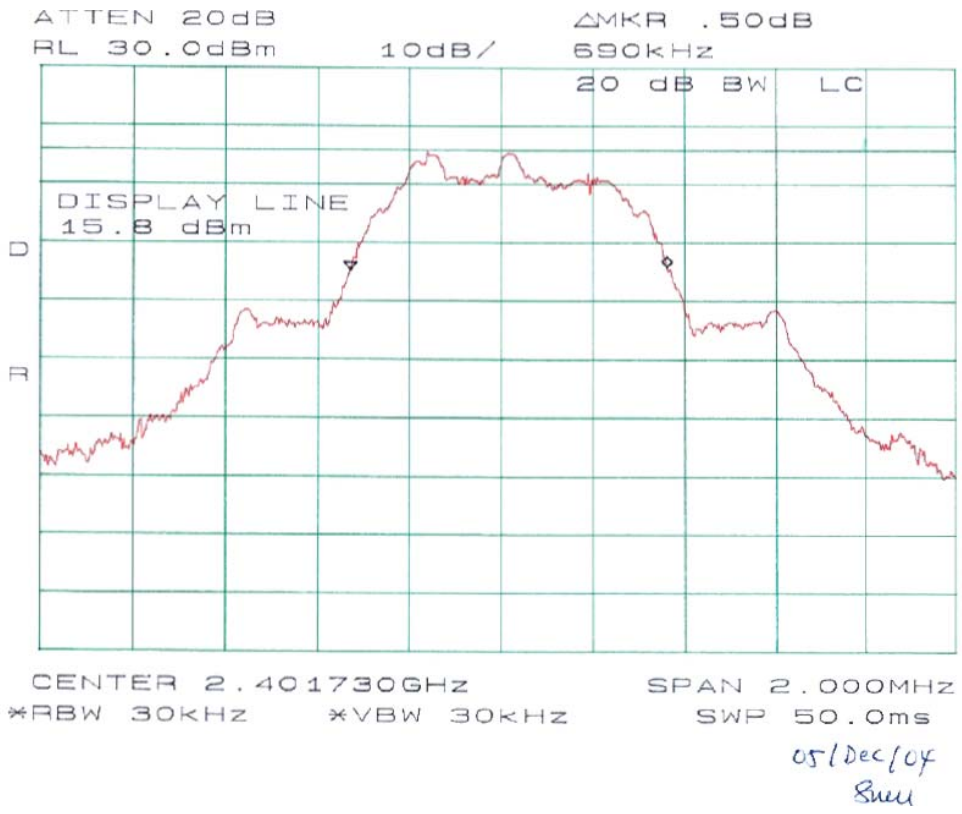
Plots for Handset:

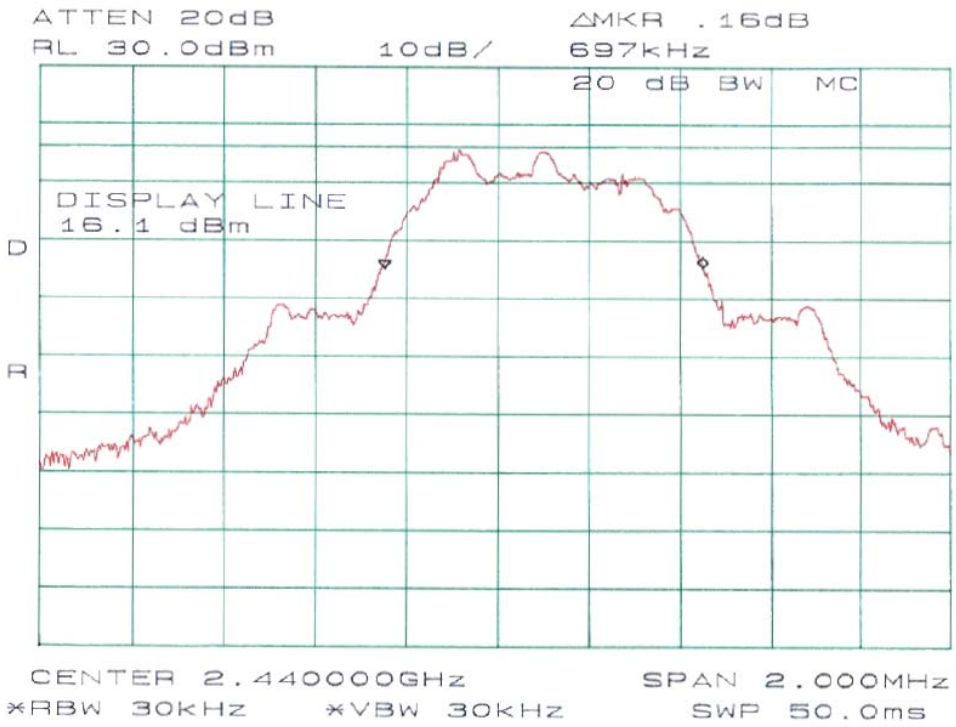




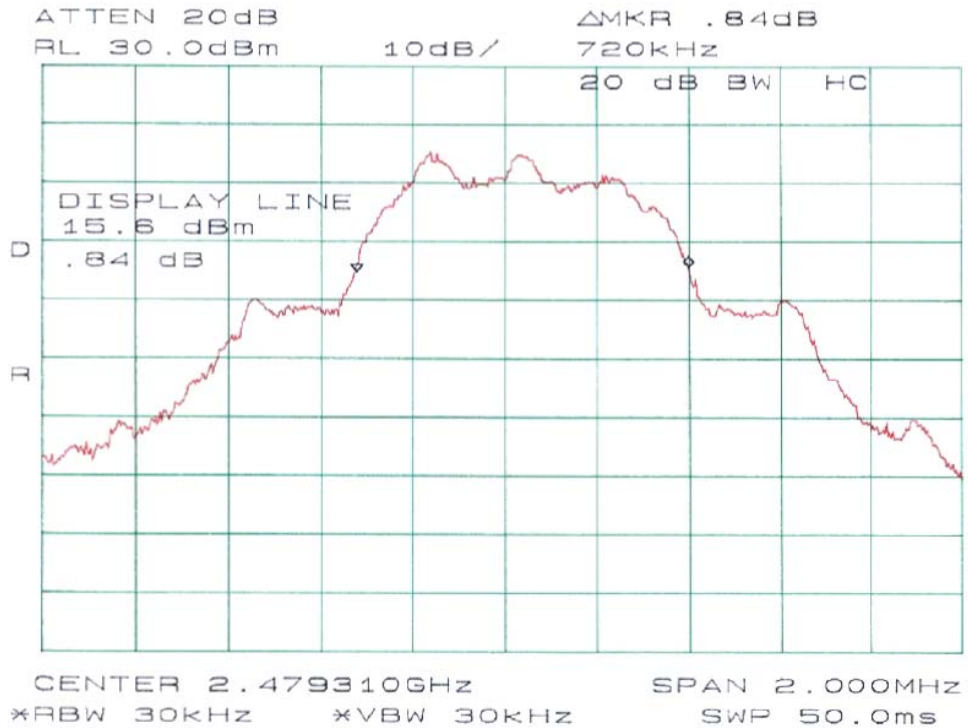


Plots for Base:





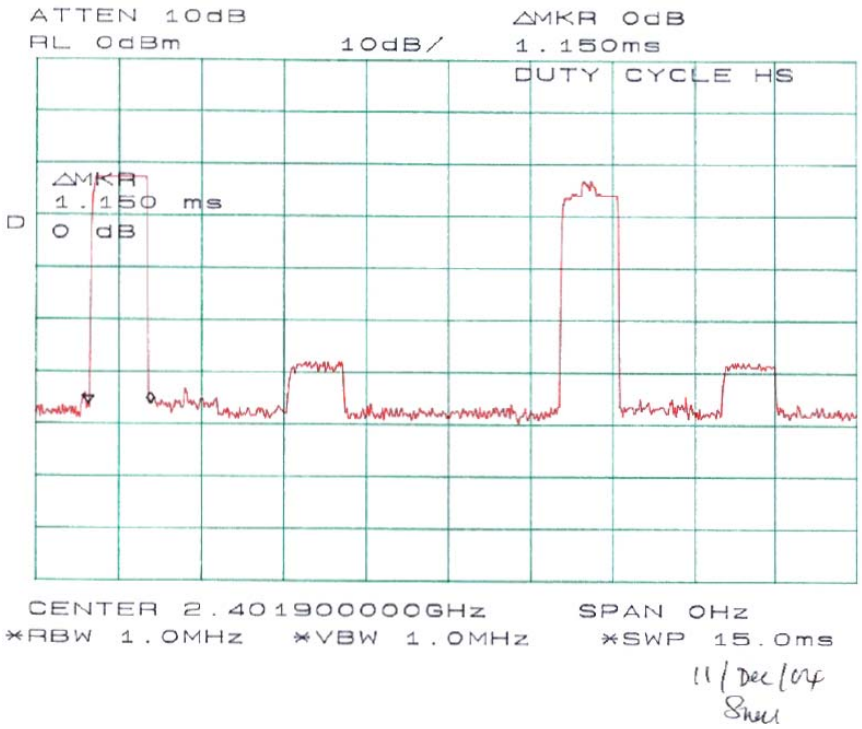
05/Dec/04
Snell

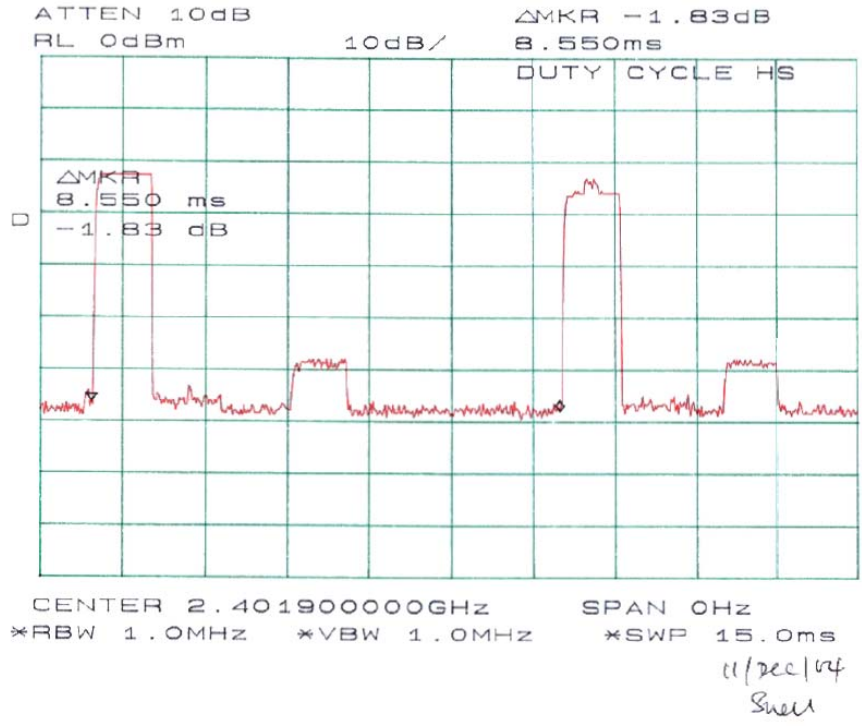


05/Dec/04
Snell

§15.247 (b)(4) - RF EXPOSURE

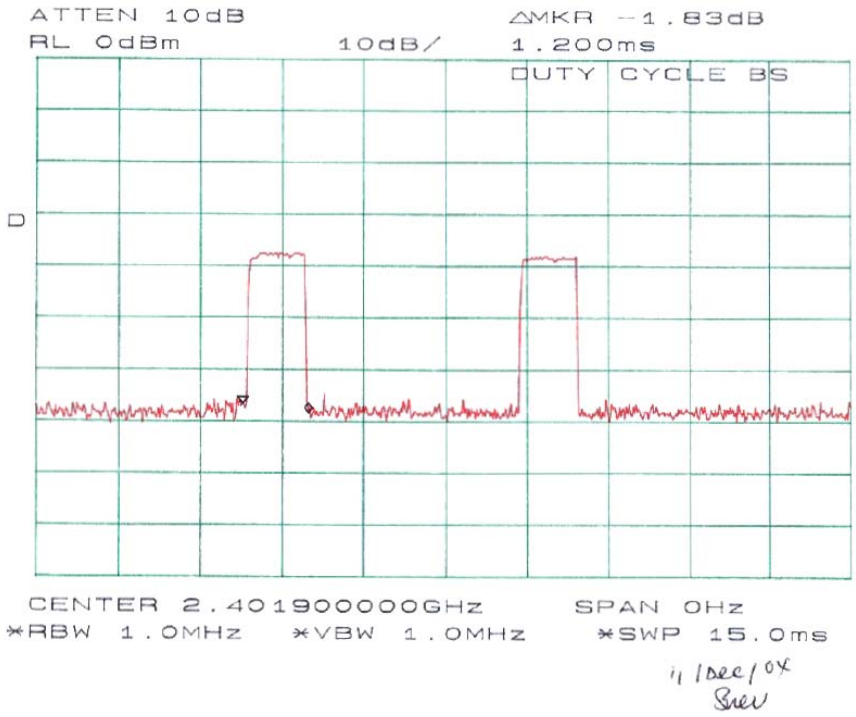
Please see the plots hereinafter for duty cycle measurement for handset:

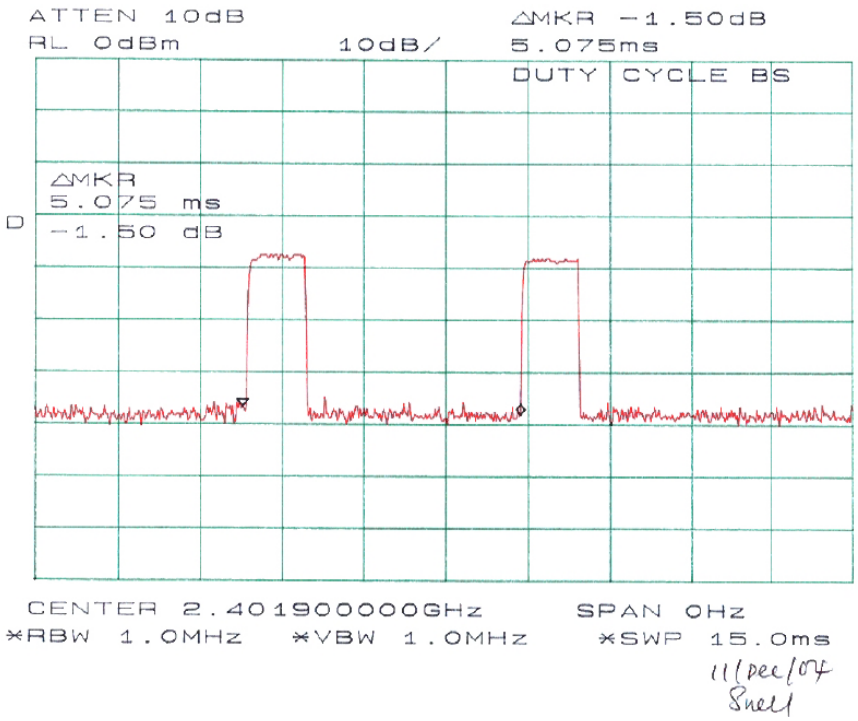




Duty Cycle = TXon / (TXon + TXoff) = 1.15/8.55 = 13.45%
Antenna Gain = 0, d < 2.5cm
Average Power = Peak Power x duty cycle = 24.55mW x 13.45% = 3.302mW < (60/2.4) mW

Please see the plots hereinafter for duty cycle measurement for base:





Duty Cycle = TXon / (TXon + TXoff) = 1.20/5.075 = 23.65%
Antenna Gain = 0, d < 2.5cm
Average Power = Peak Power x duty cycle = 40.7mW x 23.65% = 9.626mW < (60/2.4) mW

Therefore, there is no SAR testing required.

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

Standard Applicable

According to §15.247(d), 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 100 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	E4448A	Spectrum Analyzer	2004-10-04

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

Environmental Conditions

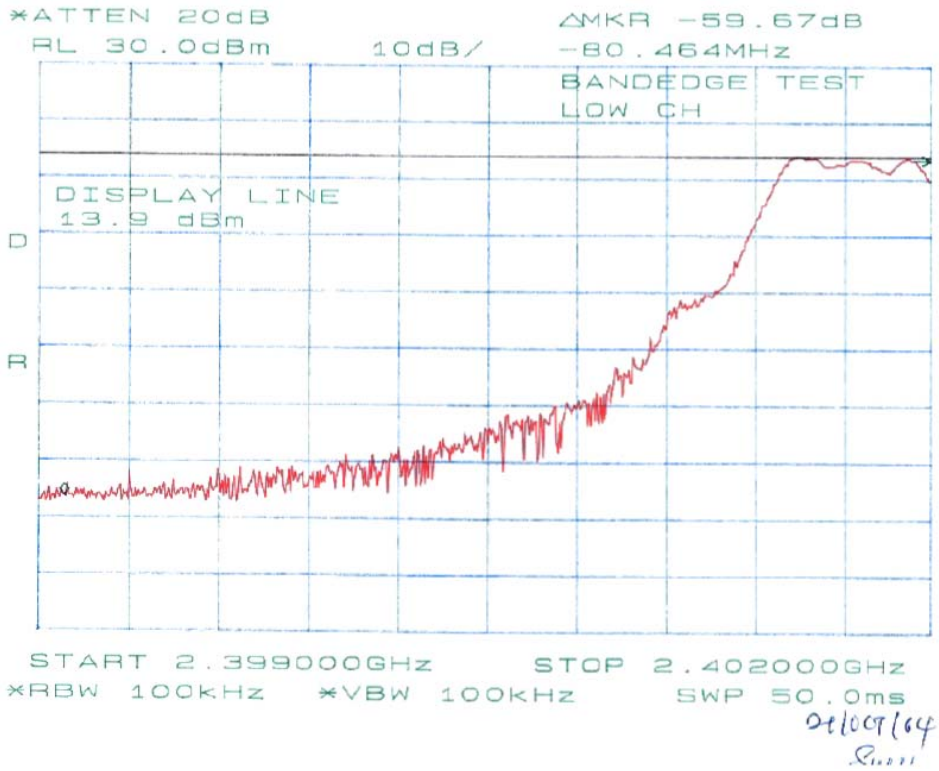
Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

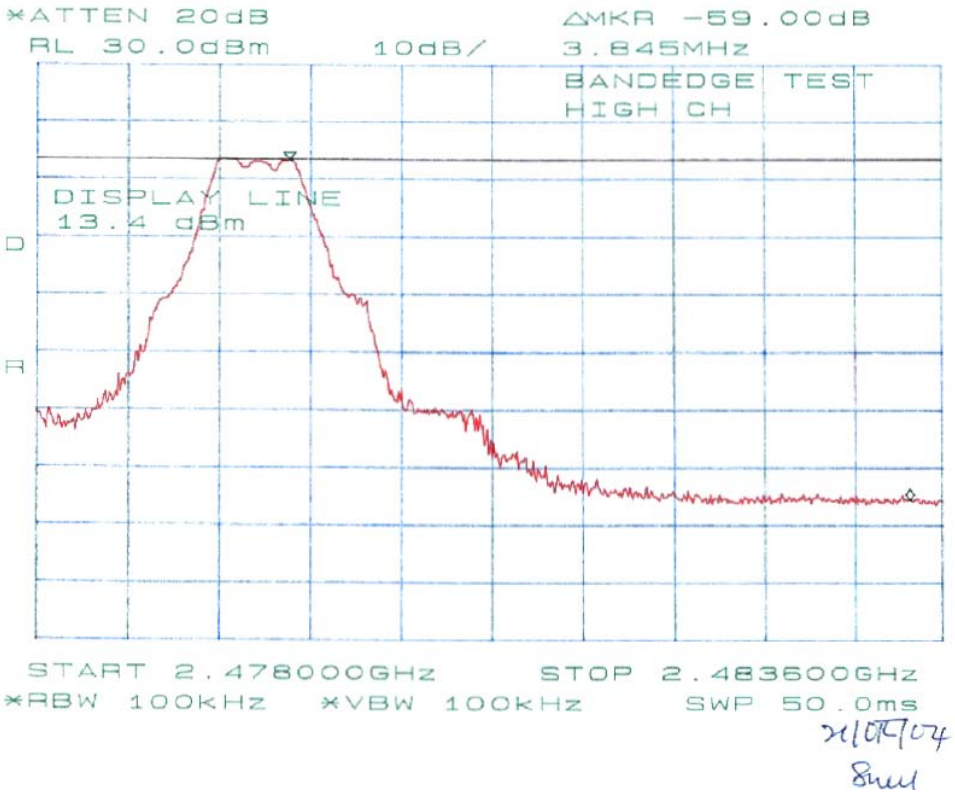
**The testing was performed by Snell Leong on 2004-12-04.*

Plots of 100kHz Bandwidth of Band Edge

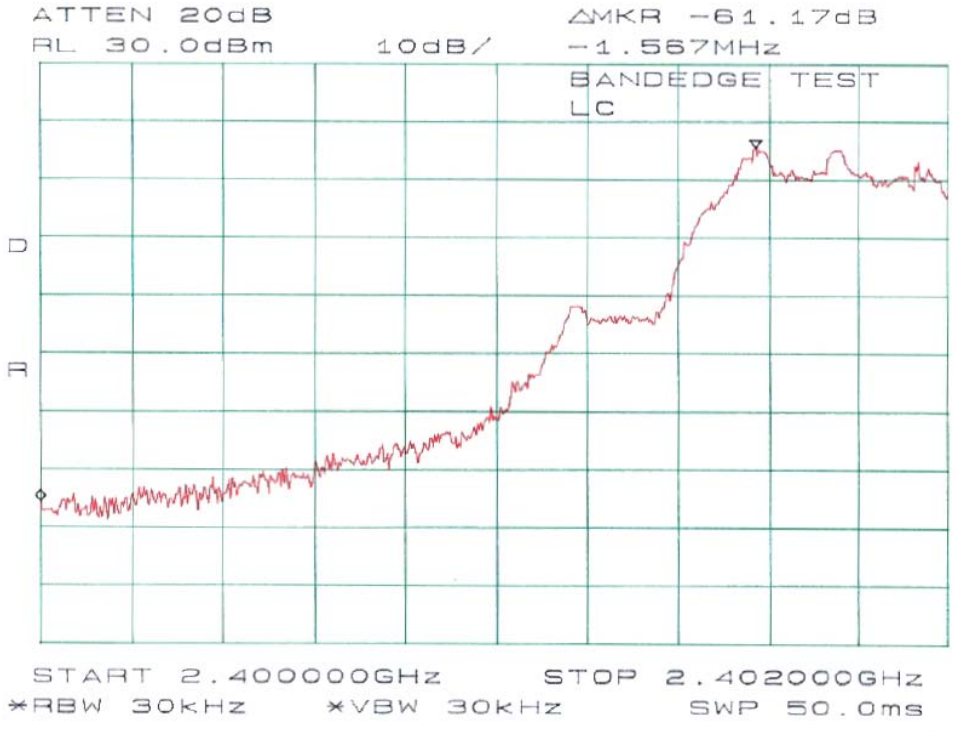
Please refer the following plots.

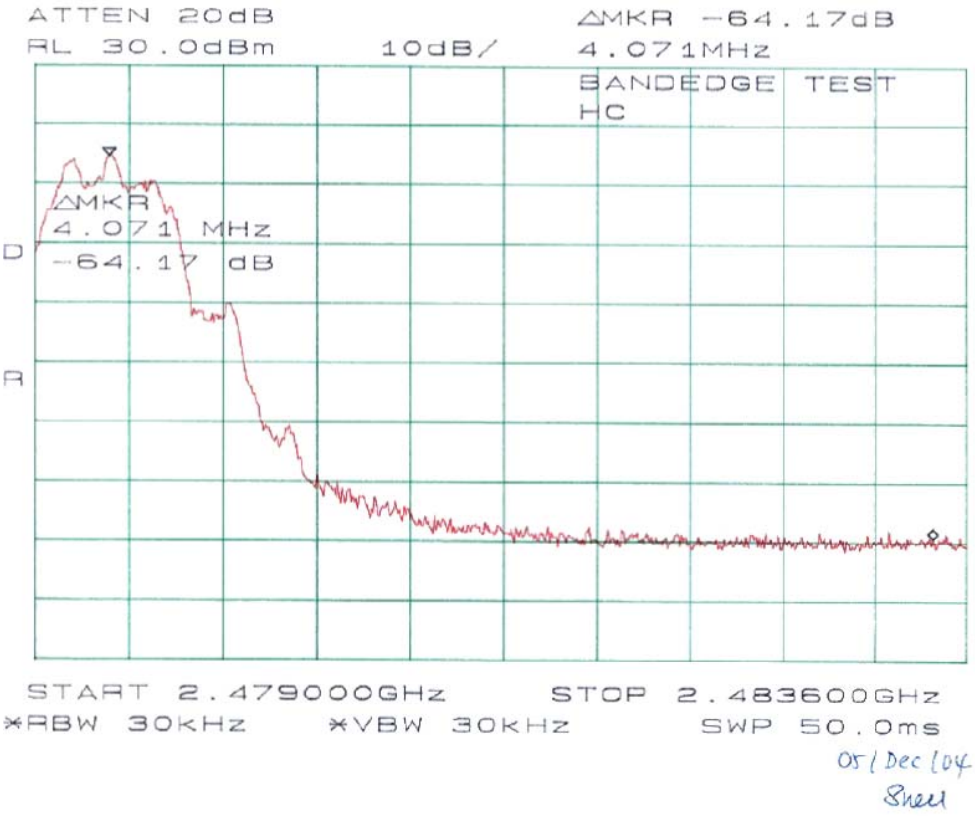
Plots for Handset:





Plots for Base:





SPURIOUS EMISSION AT ANTENNA PORT

Standard Applicable

According to §2.1051, The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

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

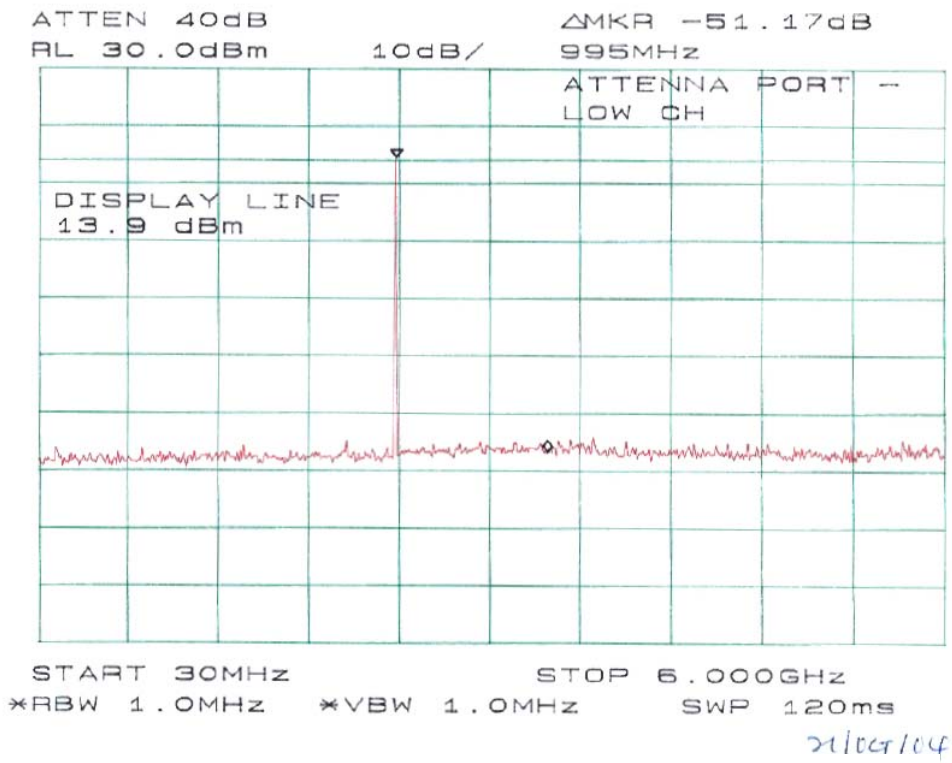
Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

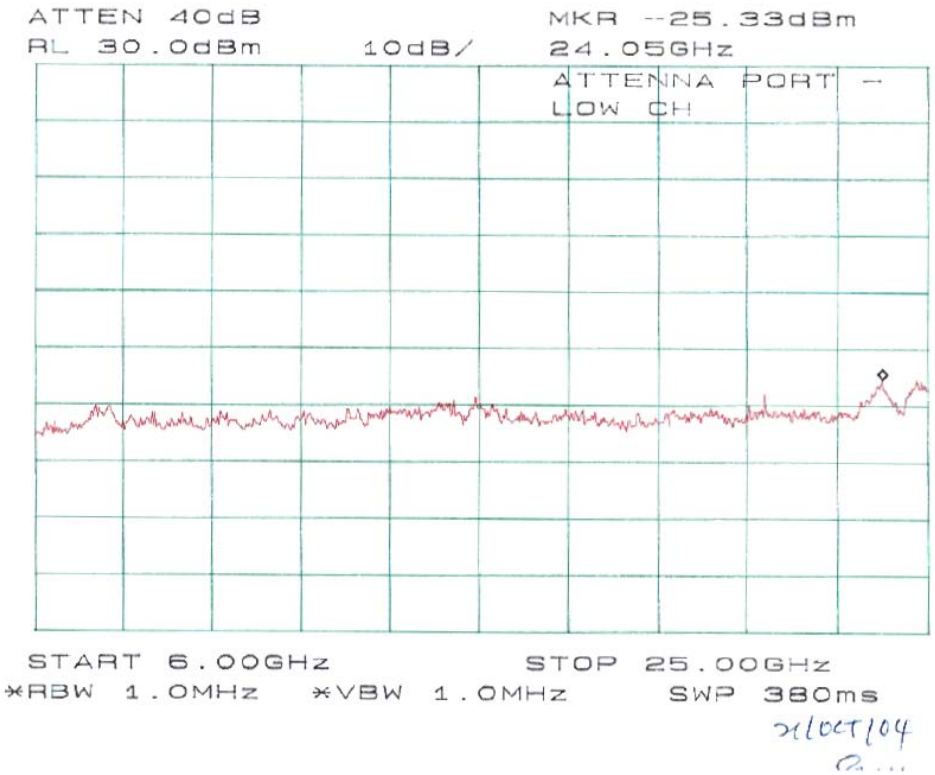
**The testing was performed by Snell Leong on 2004-12-04.*

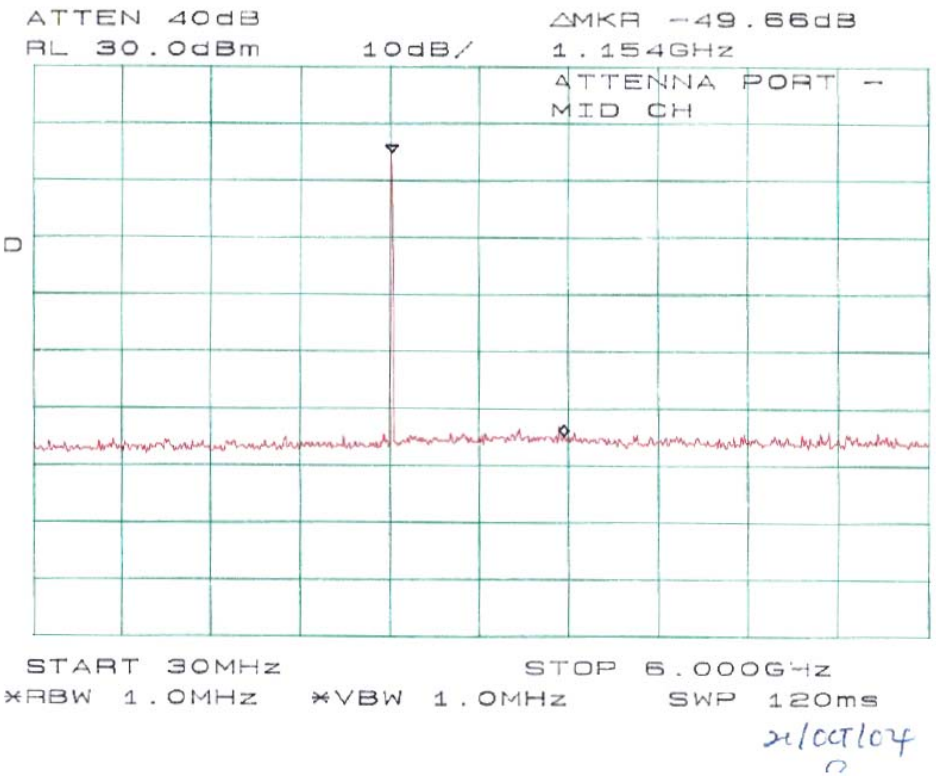
Measurement Results

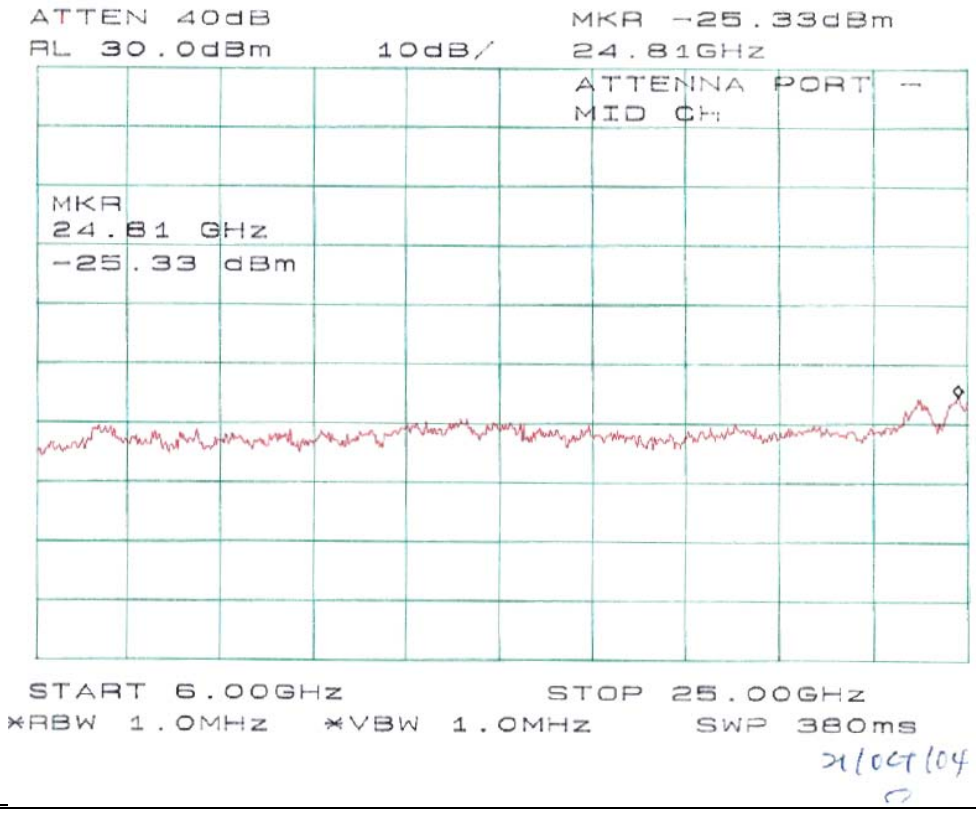
Please refer to the following plots.

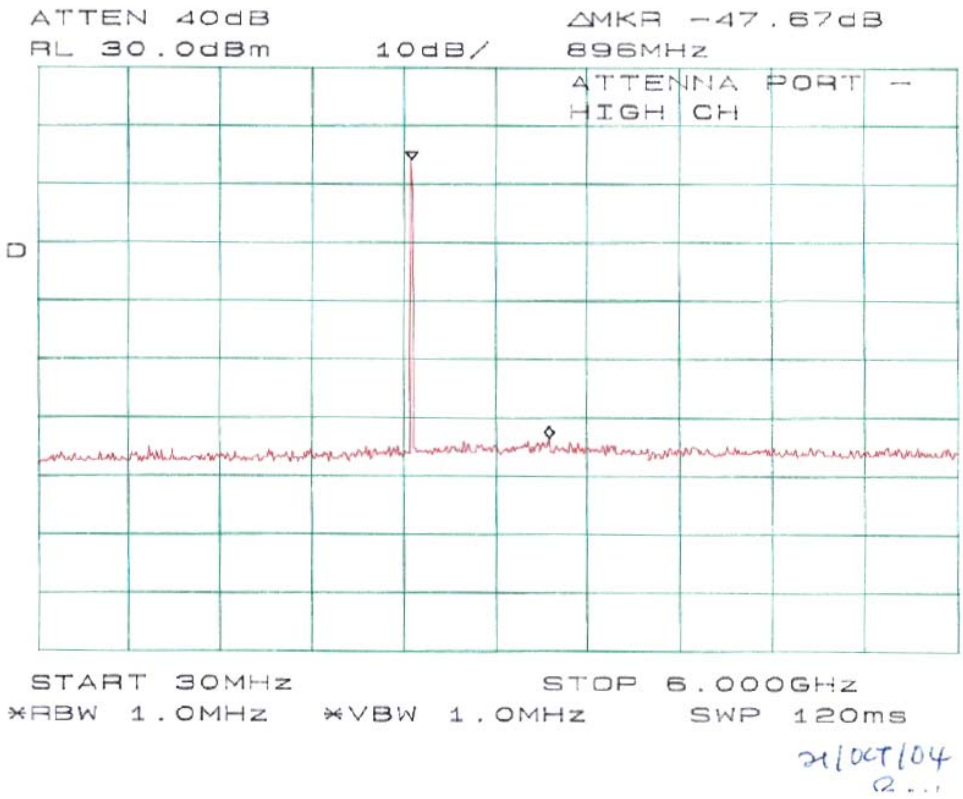
Plots for Handset:

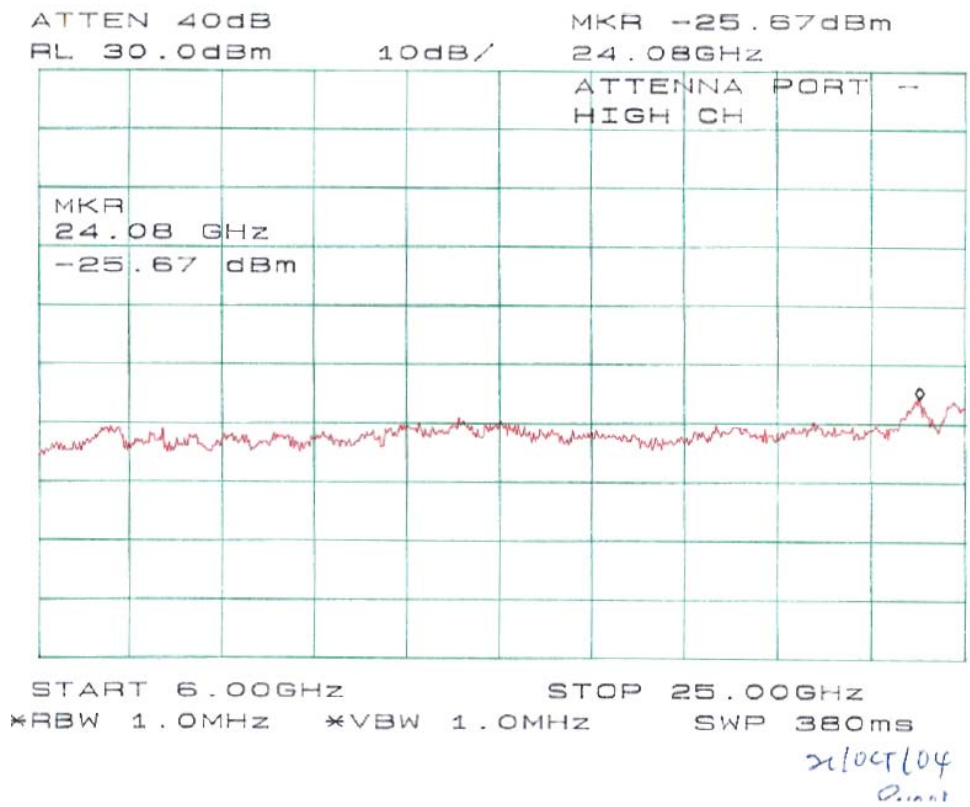




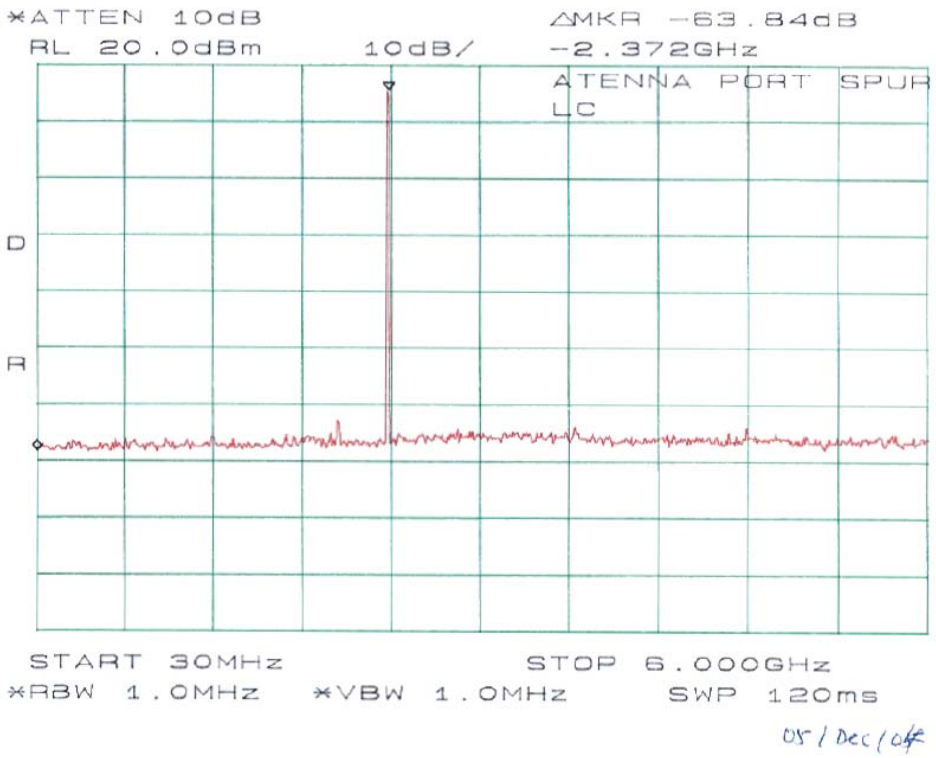

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -49.66dB
1.154GHz
ATTENNA PORT -
MID CH
D
START 30MHz
STOP 6.000GHz
*RBW 1.0MHz
*VBW 1.0MHz
SWP 120ms
24/OCT/04

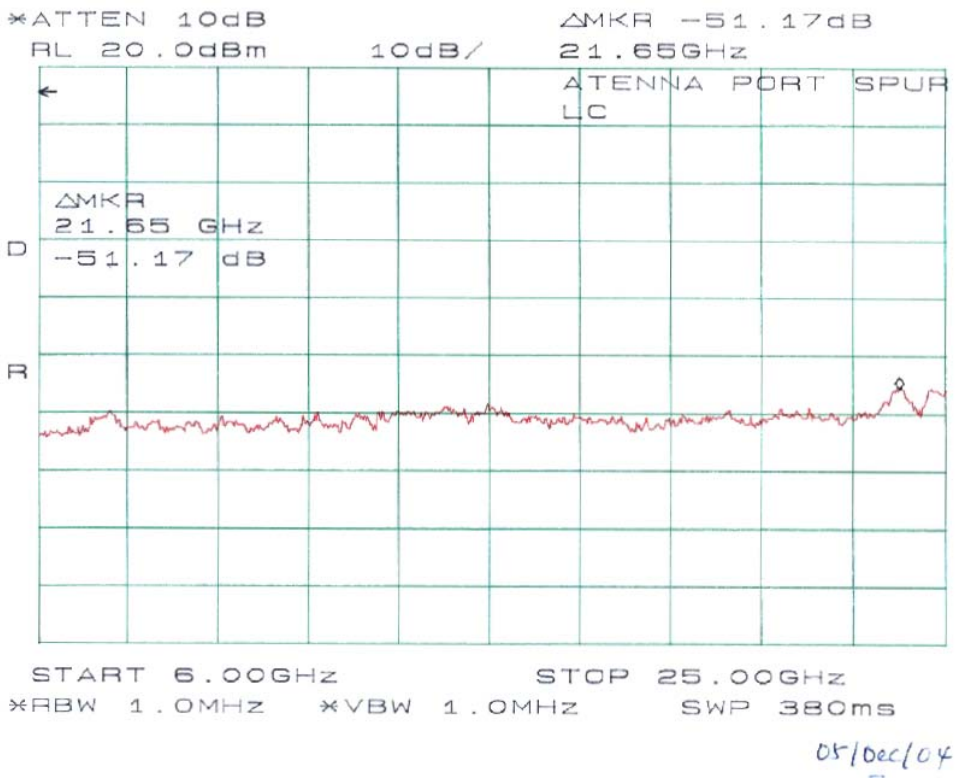

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -25.33dBm
24.81GHz
ATTENNA PORT -
MID CH
MKR
24.81 GHz
-25.33 dBm
START 6.00GHz
STOP 25.00GHz
*RBW 1.0MHz
*VBW 1.0MHz
SWP 380ms
24/OCT/04

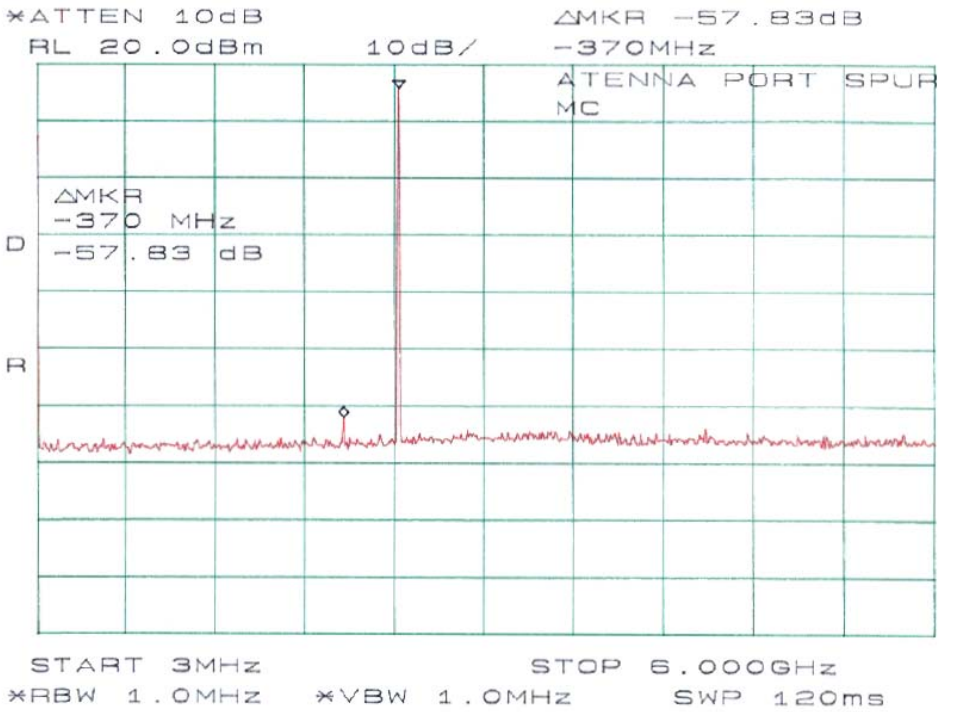

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -47.67dB
896MHz
ATTENNA PORT --
HIGH CH
START 30MHz
STOP 6.000GHz
*RBW 1.0MHz
*VBW 1.0MHz
SWP 120ms
26/OCT/04


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -25.67dBm
24.08GHz
ATTENNA PORT --
HIGH CH
MKR
24.08 GHz
-25.67 dBm
START 6.00GHz
STOP 25.00GHz
*RBW 1.0MHz
*VBW 1.0MHz
SWP 380ms
26/OCT/04

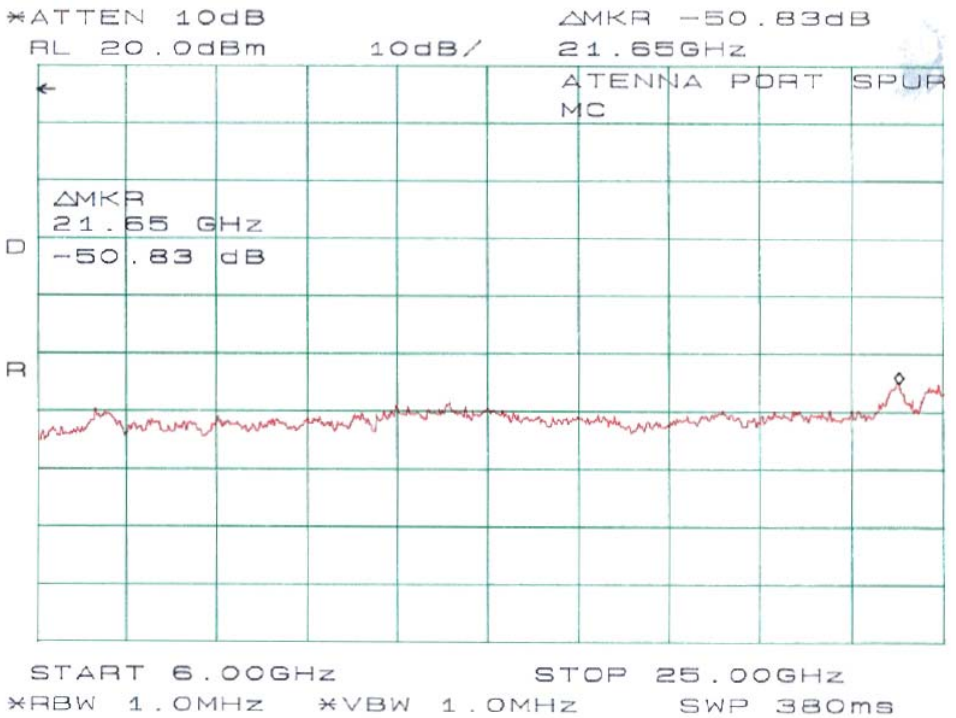
Plots for Base:



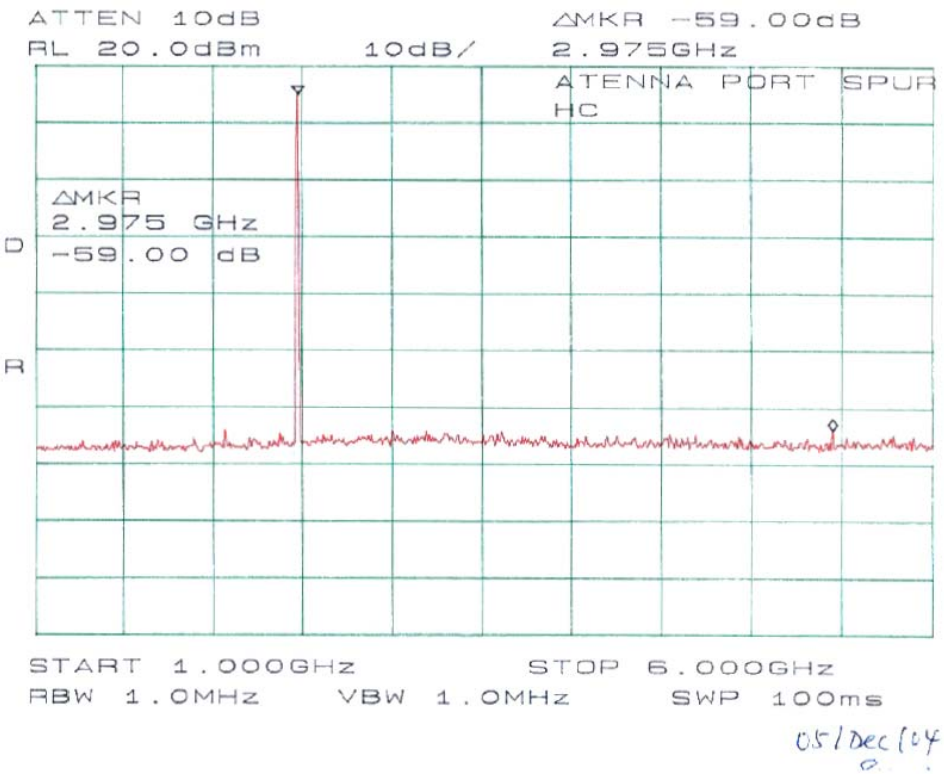


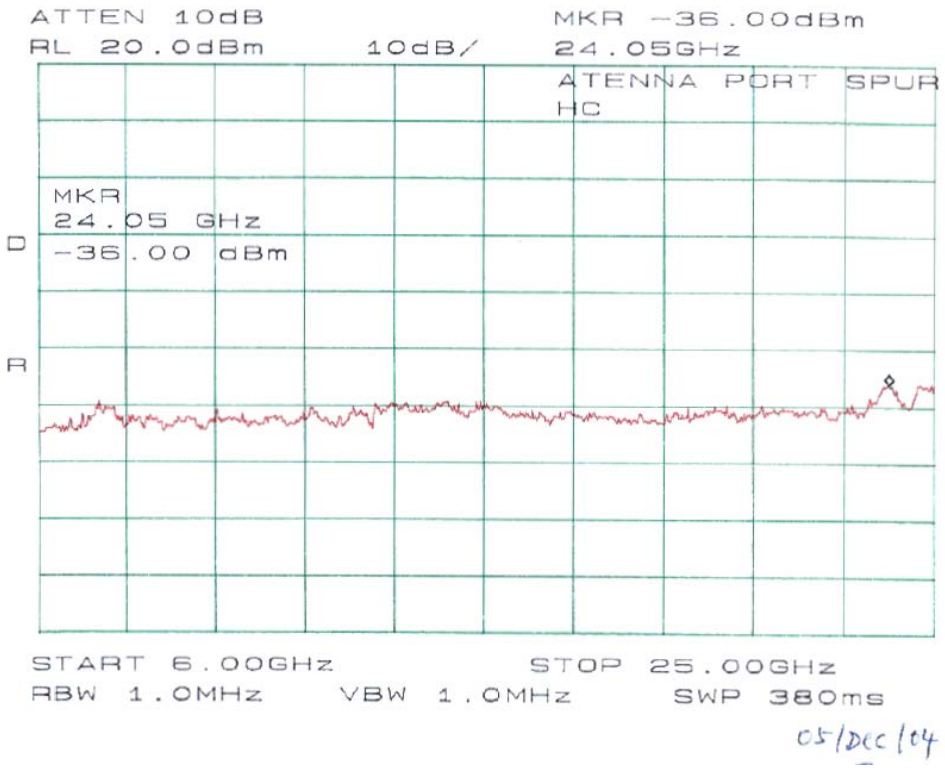


05 Dec 04



05 Dec 04


ATTEN 10dB
RL 20.0dBm
10dB/
ΔMKR -59.00dB
2.975GHz
ATENNA PORT SPUR
HC
ΔMKR
2.975 GHz
-59.00 dB
D
R
START 1.000GHz
STOP 6.000GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 100ms
05/Dec/04


ATTEN 10dB
RL 20.0dBm
10dB/
MKR -36.00dBm
24.05GHz
ATENNA PORT SPUR
HC
MKR
24.05 GHz
-36.00 dBm
D
R
START 6.00GHz
STOP 25.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 380ms
05/Dec/04