



FCC PART 15.247
EMI MEASUREMENT AND TEST REPORT

For

VTech Telecommunications Ltd.

23/F Tai Ping Industrial Center Block 1
57 Ting Kok Road, Tai Po NT, Hong Kong

FCC ID: EW780-5681-00

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: 5.8 GHz Corded/Cordless Answering System
	
Test Engineer:	Snell Leong
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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 *VTech Telecommunications Ltd.* product, FCC ID: *EW780-5681-00*, or the “EUT” as referred to in this report is a 5.8 GHz Corded/Cordless Answering System, which measures approximately 190mmL x 50mm W x 35mm H for the handset unit and 2200mmL x 200mm W x 100mm H for the base unit . The EUT is a FHSS device, which operates at the frequency range of 5744.736 – 5825.952MHz, with the maximum conducted output power of 341.19mW for handset and 368.98mW for base.

* *The test data gathered are from a production sample, S/N: HSPPA002, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *VTech Telecommunications 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 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 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 radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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 current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

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.

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
Teltone	Line Simulator	TLS-3B-01	80071	N/A
Southern Telecom	Phone	N/A	N/A	N/A

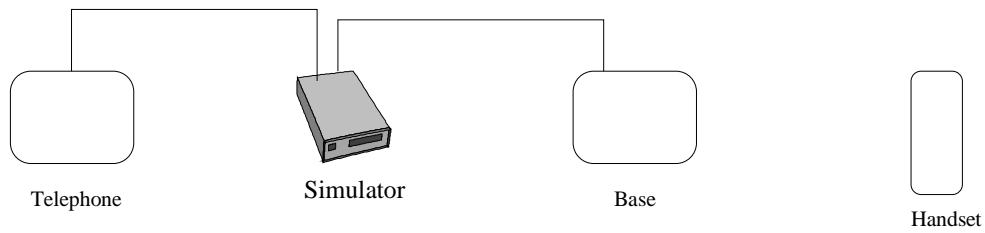
External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Phone Line	1.0	Line 1 Port / Line Simulator	Phone
Phone Line	1.0	Line 2 Port / Line Simulator	EUT

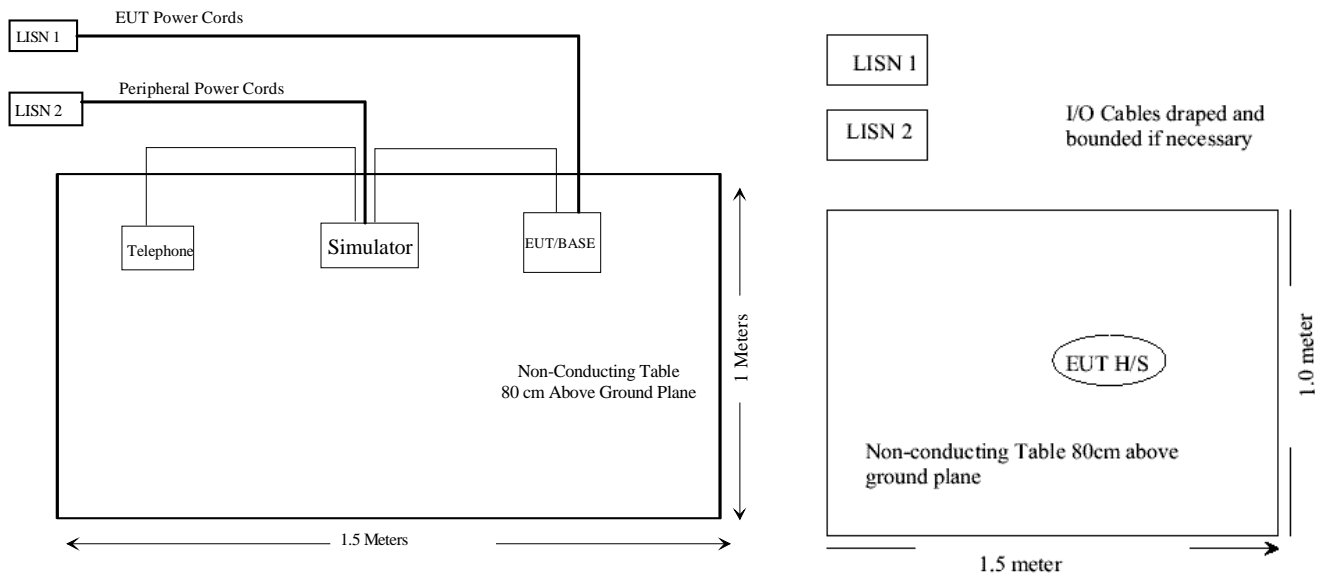
Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
V tech	AC Adapter	U080085D31	N/A	N/A

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	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.209	Radiated Emission	Compliant*
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1) (ii)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (ii)	Dwell Time of Each Frequency within a 30 Second Period of time	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(4) § 2.1093	RF Safety Requirements	Compliant
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§ 2.1051	Spurious Emission at Antenna Port	Compliant

*: Test data are within measurement uncertainty.

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 receiver, 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.

Receiver Setup

The receiver was set to investigate the frequency from 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	LISN	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15

* **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:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

*The testing was performed by Snell Leong on 2005-04-14.

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:

-18.1 dB at 13.300 MHz in the Neutral conductor,

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dB μ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB μ V	Margin dB
13.300	31.9	Ave	Neutral	50.00	-18.1
0.150	47.8	QP	Neutral	66.00	-18.2
0.150	47.0	QP	Line	66.00	-19.0
13.300	29.6	Ave	Line	50.00	-20.4
14.400	24.4	Ave	Line	50.00	-25.6
13.300	31.6	QP	Neutral	60.00	-28.4
13.300	29.2	QP	Line	60.00	-30.8
14.400	27.9	QP	Line	60.00	-32.1
17.900	15.6	Ave	Neutral	50.00	-34.4
0.150	19.2	Ave	Neutral	56.00	-36.8
0.150	16.8	Ave	Line	56.00	-39.2
17.900	15.5	QP	Neutral	60.00	-44.5

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
Class B

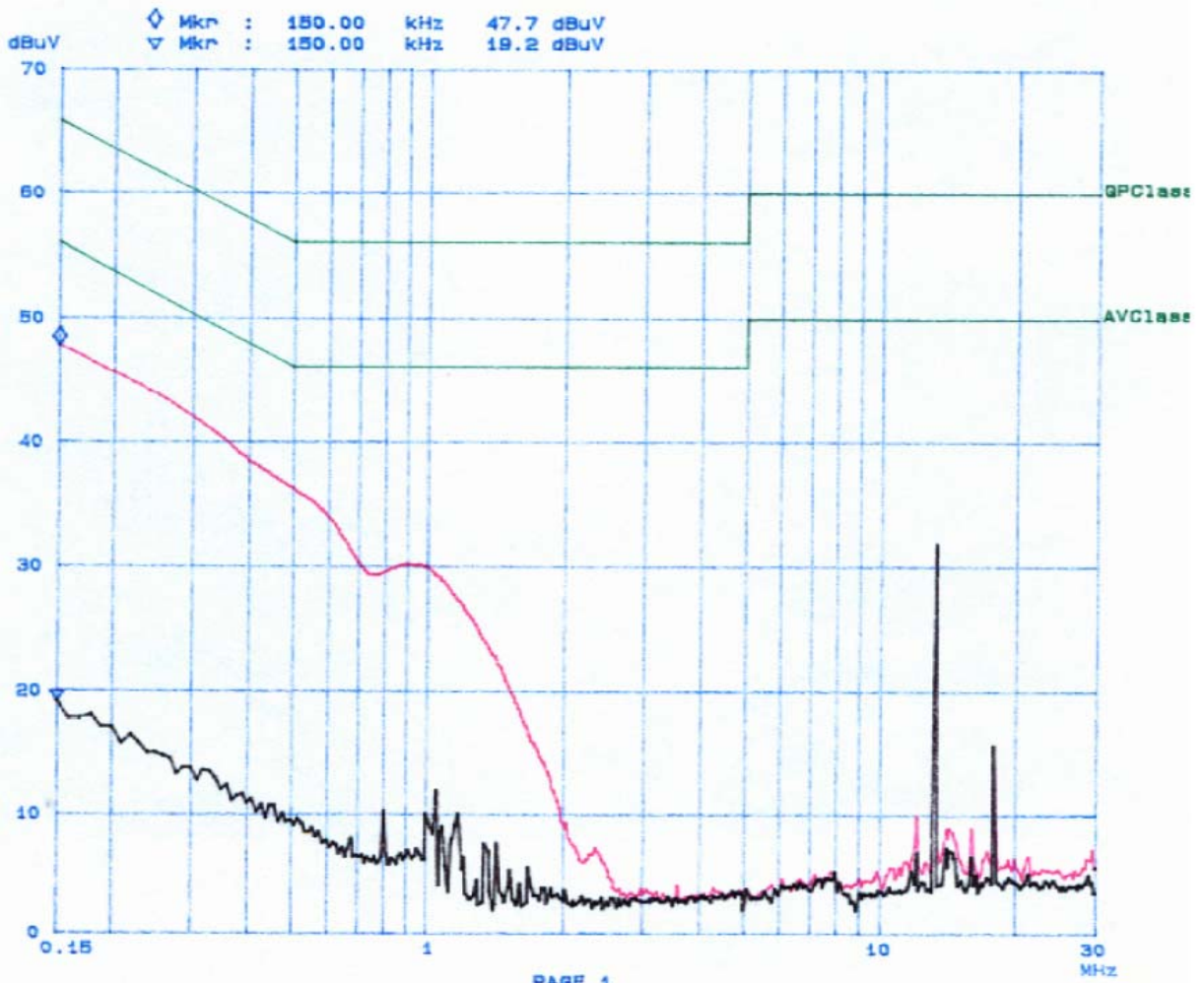
14. Apr 05 15:45

14 April 2005
Snew

EUT: 5.8GHz Cordless Phone
Manuf: Vtech
Op Cond: Normal
Operator: SNELL
Comment: N
110Vac

Scan Settings (3 Ranges)

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



Bay Area Compliance Laboratory Corp
Class B

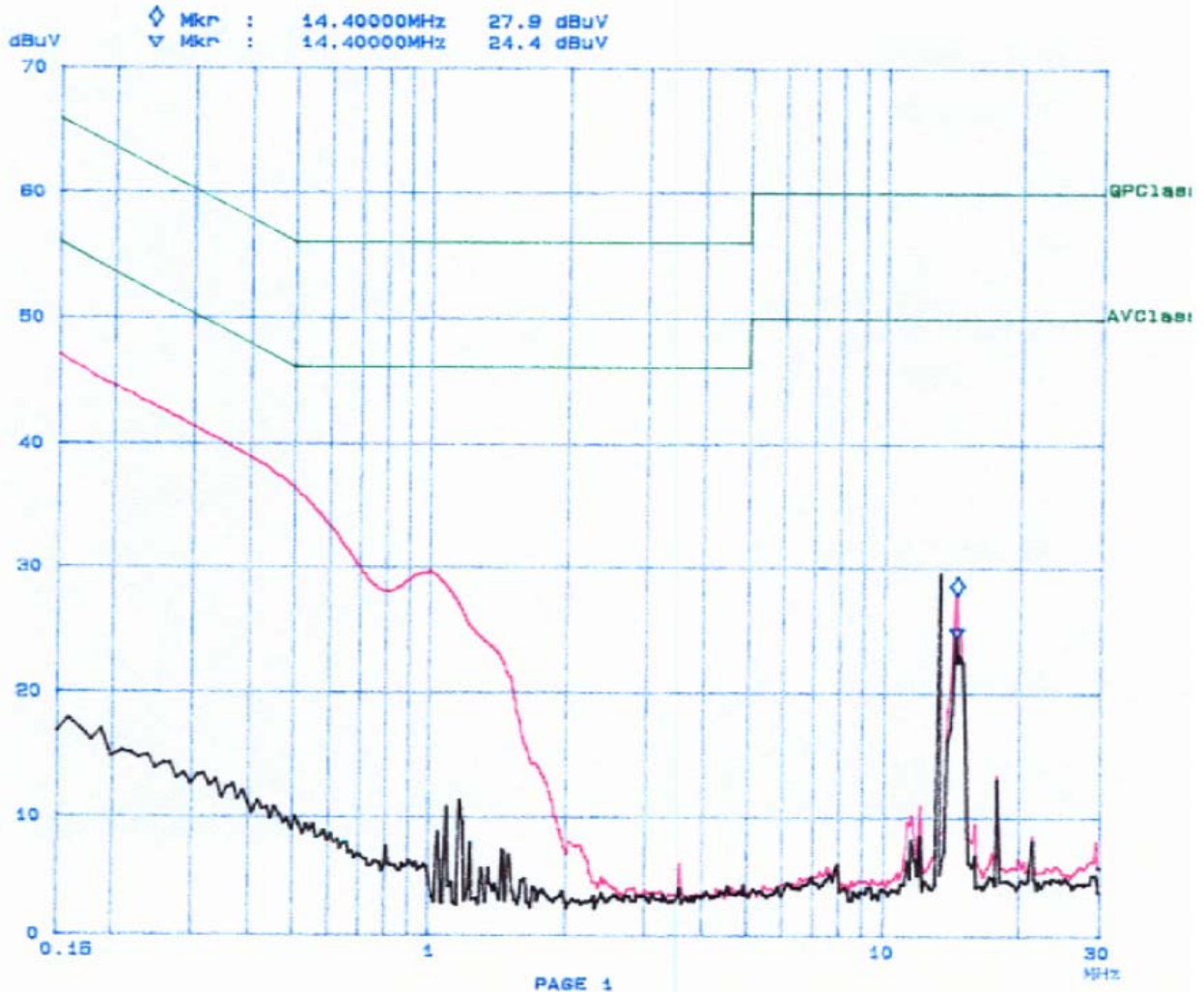
14. Apr 05 16:27

14 / April 2005
Snell

EUT: 5.8GHz Cordless Phone
Manuf: Vtech
Op Cond: Normal
Operator: SNELL
Comment: L
110Vac

Scan Settings (3 Ranges)

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



§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 C63.4-2003. 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.

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 40GHz.

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Wisewave	Antenna, Horn, Std	ARH-2823-02	10555-02	2004-12-13
HP	Amplifier, Pre	8447D	2944A10198	2004-08-20
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10
EMCO	Antenna, Biconical	3110B	9603-2315	2004-12-14
EMCO	Antenna, log-Periodic	3148	4-1155	2004-12-14

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

Environmental Conditions

Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2005-04-14.*

Test Procedure

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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

Summary of Test Results

According to the recorded data in following table, the EUT test data are within the measurement uncertainty of $\pm 4.0\text{dB}$, and had the worst margin of:

Base:

- 0.5 dB at 11489.472 MHz in the **Vertical** polarization, Low Channel, 3 meters
- 0.4 dB at 11570.668 MHz in the **Vertical** polarization, Middle Channel, 3 meters
- 1.7 dB at 11651.9040 MHz in the **Vertical** polarization, High Channel, 3 meters
- 1.5 dB at 82.940 MHz in the **Vertical** polarization, Unintentional Emission, 3 meters

Handset:

- 10.4 dB at 11489.472 MHz in the **Vertical** polarization, Low Channel, 3 meters
- 8.6 dB at 11570.668 MHz in the **Vertical** polarization, Middle Channel, 3 meters
- 9.1 dB at 11651.9040 MHz in the **Vertical** polarization, High Channel, 3 meters
- 17.7 dB at 33.46 MHz in the **Vertical** polarization, Unintentional Emission, 3 meters

Note: Test was conducted in non-hopping continuous transmitting mode.

Base, 3 Meters Radiated Emission Test Data

Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15.247			Comments
Frequency MHz	Ampl. dB μ V/m		Direction Degree	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	
Low Channel											
5744.7360	117.7	90	1.0	v	34.1	3.4	34.5	120.7			Fund/Peak
5744.7360	104.3	0	1.2	h	34.1	3.4	34.5	107.3			Fund/Peak
5744.7360	105.4	180	1.2	v	34.1	3.4	34.5	108.4			Ave
5744.7360	96.4	0	1.2	h	34.1	3.4	34.5	99.4			Ave
11489.4720	41.3	270	2.4	v	39.6	5.6	33.0	53.5	54	-0.5	Ave
11489.4720	58.1	270	2.4	v	39.6	5.6	33.0	70.3	74	-3.7	Peak
11489.4720	37.9	180	2.3	h	39.6	5.6	33.0	50.1	54	-3.9	Ave
6260.0000	40.3	90	2.0	v	35.1	3.7	34.5	44.6	54	-9.4	Peak
4802.0000	43.5	180	2.3	v	32.5	3.1	34.8	44.3	54	-9.7	Ave
11489.4720	51.5	180	2.3	h	39.6	5.6	33.0	63.7	74	-10.3	Peak
4802.0000	41.5	180	2.3	h	32.5	3.1	34.8	42.3	54	-11.7	Peak
6260.0000	35.5	90	2.0	h	35.1	3.7	34.5	39.8	54	-14.2	Ave
2401.0000	42.9	0	2.0	h	28.1	2.0	35.8	37.2	54	-16.9	Ave
4802.0000	54.9	0	2.2	h	32.5	3.1	34.8	55.7	74	-18.3	Peak
2401.0000	36.7	0	2.1	v	28.1	2.0	35.8	31.0	54	-23.0	Ave
4802.0000	49.3	90	2.2	v	32.5	3.1	34.8	50.1	74	-23.9	Peak
6260.0000	45.2	90	2.5	h	35.1	3.7	34.5	49.5	74	-24.5	Ave
6260.0000	41.1	90	2.1	h	35.1	3.7	34.5	45.4	74	-28.6	Peak
17234.2080	29.3	90	2.0	h	44.3	7.1	31.0	49.7	79.4	-29.7	Ave
2401.0000	49.4	90	2.1	v	28.1	2.0	35.8	43.7	74	-30.3	Peak
17234.2080	35.3	180	2.0	h	44.3	7.1	31.0	55.7	87.3	-31.6	Peak
2401.0000	47.0	90	2.0	h	28.1	2.0	35.8	41.3	74	-32.7	Peak
17234.2080	45.8	90	2.0	v	44.3	7.1	31.0	66.2	100.7	-34.4	Peak
17234.2080	30.8	180	2.0	v	44.3	7.1	31.0	51.2	88.4	-37.2	Ave

Table Cont.

Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15.247			Comments
Frequency MHz	Ampl. dB μ V/m		Direction Degree	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	
Middle Channel											
5785.3440	115.7	90	1.2	v	34.1	3.4	34.5	118.7			Fund/Peak
5785.3440	104.6	180	1.4	h	34.1	3.4	34.5	107.6			Fund/Peak
5785.3440	103.6	180	1.3	v	34.1	3.4	34.5	106.6			Ave
5785.3440	94.6	0	1.5	h	34.1	3.4	34.5	97.6			Ave
11570.6880	41.2	270	2.4	v	39.1	5.4	32.2	53.6	54	-0.4	Ave
11570.6880	38.9	180	2.2	h	39.1	5.4	32.2	51.3	54	-2.7	Ave
11570.6880	58.4	270	2.4	v	39.1	5.4	32.2	70.8	74	-3.2	Peak
4883.1500	47.3	270	2.4	v	32.5	3.1	34.8	48.1	54	-5.9	Ave
4883.1500	45.2	180	2.2	h	32.5	3.1	34.8	46.0	54	-8.0	Ave
11570.6880	51.7	180	2.2	h	39.1	5.4	32.2	64.1	74	-9.9	Peak
6485.4500	38.6	270	2.4	v	35.1	3.7	34.5	42.9	54	-11.1	Ave
2441.7000	47.4	270	2.4	v	28.1	2.0	35.8	41.7	54	-12.3	Ave
6485.4500	36.9	180	2.3	h	35.1	3.7	34.5	41.2	54	-12.8	Ave
2441.7000	45.9	180	2.3	h	28.1	2.0	35.8	40.2	54	-13.8	Ave
6485.4500	48.7	270	2.4	v	35.1	3.7	34.5	53.0	74	-21.0	Peak
4883.1500	50.7	270	2.4	v	32.5	3.1	34.8	51.5	74	-22.5	Peak
6485.4500	46.1	180	2.2	h	35.1	3.7	34.5	50.4	74	-23.6	Peak
4883.1500	48.5	180	2.3	h	32.5	3.1	34.8	49.3	74	-24.7	Peak
17356.0320	28.4	180	2.1	h	44.3	7.1	31.0	48.8	77.6	-28.8	Ave
2441.7000	50.4	270	2.4	v	28.1	2.0	35.8	44.7	74	-29.3	Peak
17356.0320	36.7	180	2.3	h	44.3	7.1	31.0	57.1	87.6	-30.5	Peak
2441.7000	48.9	180	2.1	h	28.1	2.0	35.8	43.2	74	-30.8	Peak
17356.0320	32.0	270	2.4	v	44.3	7.1	31.0	52.4	86.6	-34.2	Ave
17356.0320	37.8	270	2.4	v	44.3	7.1	31.0	58.2	98.7	-40.5	Peak

Table Cont.

Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15.247			
Frequency MHz	Ampl. dBμV/m		Direction Degree	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB	Comments
High Channel											
5825.9520	113.7	180	1.2	v	34.1	3.4	34.5	116.7			Fund/Peak
5825.9520	102.4	0	1.2	h	34.1	3.4	34.5	105.4			Fund/Peak
5825.9520	101.2	0	1.3	v	34.1	3.4	34.5	104.2			Ave
5825.9520	90.3	180	1.3	h	34.1	3.4	34.5	93.3			Ave
11651.9040	39.9	270	2.4	v	39.1	5.4	32.2	52.3	54	-1.7	Ave
11651.9040	36.6	90	2.1	h	39.1	5.4	32.2	48.9	54	-5.1	Ave
11651.9040	54.6	270	2.4	v	39.1	5.4	32.2	67.0	74	-7.0	Peak
11651.9040	49.3	90	2.1	h	39.1	5.4	32.2	61.6	74	-12.4	Peak
4964.0000	35.0	270	2.4	v	32.5	3.1	34.8	35.8	54	-18.2	Ave
4964.0000	34.0	90	2.1	h	32.5	3.1	34.8	34.8	54	-19.2	Ave
6716.5000	28.3	90	2.4	h	36.5	3.7	35.0	33.5	54	-20.5	Ave
17477.8560	44.0	90	2.1	h	44.3	7.1	31.0	64.4	85.4	-21.0	Peak
6716.5000	27.5	270	2.4	v	36.5	3.7	35.0	32.7	54	-21.3	Ave
4964.0000	49.1	270	2.4	v	32.5	3.1	34.8	49.9	74	-24.1	Peak
17477.8560	28.7	90	2.1	h	44.3	7.1	31.0	49.1	73.3	-24.2	Ave
6716.5000	44.3	270	2.4	v	36.5	3.7	35.0	49.5	74	-24.5	Peak
2482.2500	33.4	270	2.4	v	28.1	2.0	35.8	27.7	54	-26.3	Ave
6716.5000	42.1	90	2.4	h	36.5	3.7	35.0	47.3	74	-26.7	Peak
4964.0000	46.1	90	2.2	h	32.5	3.1	34.8	46.9	74	-27.1	Peak
2482.2500	32.5	90	2.2	h	28.1	2.0	35.8	26.8	54	-27.2	Ave
2482.2500	49.2	270	2.4	v	28.1	2.0	35.8	43.5	74	-30.5	Peak
2482.2500	48.6	90	2.1	h	28.1	2.0	35.8	42.9	74	-31.1	Peak
17477.8560	32.2	270	2.4	v	44.3	7.1	31.0	52.6	84.2	-31.6	Ave
17477.8560	39.7	270	2.4	v	44.3	7.1	31.0	60.1	96.7	-36.6	Peak

Note:

FUND: Fundamental

AVE: Average

Unintentional Emission

Frequency MHz	Indicated		Antenna	Antenna		Correction Factor			FCC 15.209	
	Ampl. dB μ V/m	Direction Degree	Height Meter	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
82.94	56.90	75	1.8	V	8.1	1.9	28.4	38.5	40	-1.5
110.58	55.07	270	2.1	H	12.1	2.2	28.2	41.2	43.5	-2.3
82.94	53.50	270	3.2	H	8.1	1.9	28.4	35.1	40	-4.9
110.58	50.59	330	1.2	V	12.1	2.2	28.2	36.7	43.5	-6.8
221.18	50.20	240	3.1	H	10.7	3.1	27.6	36.4	46	-9.6
138.23	45.12	250	1.0	V	13.8	2.4	28.1	33.2	43.5	-10.3
663.00	38.80	280	2.8	H	19.7	5.6	28.6	35.5	46	-10.5
746.57	37.06	240	3.1	H	20.3	6.0	28.3	35.1	46	-10.9
138.23	42.44	280	2.8	H	13.8	2.4	28.1	30.5	43.5	-13.0
304.13	42.69	240	3.1	H	13.6	3.6	27.4	32.5	46	-13.5
663.00	35.60	250	1.0	V	19.7	5.6	28.6	32.3	46	-13.7
221.18	43.46	270	1.0	V	10.7	3.1	27.6	29.7	46	-16.3
746.57	30.50	330	3.0	V	20.3	6.0	28.3	28.5	46	-17.5
304.13	36.10	270	1.0	V	13.6	3.6	27.4	25.9	46	-20.1

Handset, 3 Meters Radiated Emission Test Data

Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15.247			Comments
Frequency MHz	Ampl. dB μ V/m		Direction Degree	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	
Low Channel											
5744.7360	117.8	90	1.0	v	34.1	3.4	34.5	120.8			Fund/Peak
5744.7360	96.7	0	1.2	h	34.1	3.4	34.5	99.7			Fund/Peak
5744.7360	101.8	180	1.2	v	34.1	3.4	34.5	104.8			Ave
5744.7360	80.3	0	1.2	h	34.1	3.4	34.5	83.3			Ave
11489.4720	31.4	120	1.3	v	39.6	5.6	33.0	43.6	54	-10.4	Ave
6687.2300	57.9	180	1.4	v	36.5	3.7	35.0	63.1	74	-10.9	Peak
11489.4720	30.2	45	1.5	h	39.6	5.6	33.0	42.4	54	-11.6	Ave
5228.9300	59.3	200	1.4	h	33.9	3.2	34.3	62.1	74	-11.9	Peak
11489.4720	47.4	180	1.3	v	39.6	5.6	33.0	59.6	74	-14.4	Peak
6687.2300	33.8	180	1.4	v	36.5	3.7	35.0	39.0	54	-15.0	Ave
11489.4720	46.5	45	1.3	h	39.6	5.6	33.0	58.7	74	-15.3	Peak
4802.3000	56.7	200	1.1	h	32.5	3.1	34.8	57.5	74	-16.5	Peak
6687.2300	31.5	0	1.3	h	36.5	3.7	35.0	36.7	54	-17.3	Ave
5228.9300	32.7	200	1.4	h	33.9	3.2	34.3	35.5	54	-18.5	Ave
4802.3000	34.5	200	1.1	h	32.5	3.1	34.8	35.3	54	-18.7	Ave
5228.9300	31.2	180	1.3	v	33.9	3.2	34.3	34.0	54	-20.0	Ave
6687.2300	48.5	200	1.3	h	36.5	3.7	35.0	53.7	74	-20.3	Peak
5228.9300	50.3	150	2.5	v	33.9	3.2	34.3	53.1	74	-20.9	Peak
4802.3000	30.2	180	1.5	v	32.5	3.1	34.8	31.0	54	-23.0	Ave
4802.3000	47.9	180	1.3	v	32.5	3.1	34.8	48.7	74	-25.3	Peak
1885.3000	57.5	180	1.5	v	25.3	1.9	36.3	48.4	74	-25.6	Peak
1885.3000	35.1	180	1.5	v	25.3	1.9	36.3	26.0	54	-28.0	Ave
1885.3000	33.1	0	1.2	h	25.3	1.9	36.3	24.0	54	-30.0	Ave
1885.3000	51.2	0	1.2	h	25.3	1.9	36.3	42.1	74	-31.9	Peak

Table Cont.

Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15.247			
Frequency MHz	Ampl. dB μ V/m		Direction Degree	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	Comments
Middle Channel											
5785.3440	116.9	180	2.0	v	34.1	3.4	34.5	119.9			Fund/Peak
5785.3440	97.5	180	2.0	h	34.1	3.4	34.5	100.5			Fund/Peak
5785.3440	101.5	180	3.1	v	34.1	3.4	34.5	104.5			Ave
5785.3440	80.3	0	3.5	h	34.1	3.4	34.5	83.3			Ave
11570.6880	33.1	120	2.0	v	39.1	5.4	32.2	45.4	54	-8.6	Ave
11570.6880	49.2	180	2.0	v	39.1	5.4	32.2	61.5	74	-12.5	Peak
11570.6880	48.1	45	2.0	h	39.1	5.4	32.2	60.4	74	-13.6	Peak
6687.3000	51.6	120	1.5	v	36.5	3.7	35.0	56.8	74	-17.2	Peak
6687.3000	31.6	200	3.1	h	36.5	3.7	35.0	36.8	54	-17.2	Ave
6687.3000	31.5	120	1.5	v	36.5	3.7	35.0	36.7	54	-17.3	Ave
4883.3300	32.1	200	3.1	h	32.5	3.1	34.8	32.9	54	-21.1	Ave
6687.3000	47.5	200	3.1	h	36.5	3.7	35.0	52.7	74	-21.3	Peak
4883.3300	31.8	120	1.5	v	32.5	3.1	34.8	32.6	54	-21.4	Ave
4883.3300	51.1	120	1.5	v	32.5	3.1	34.8	51.9	74	-22.1	Peak
1803.8000	60.8	180	2.0	v	25.3	1.9	36.3	51.7	74	-22.3	Peak
2441.5700	55.3	200	3.1	h	28.1	2.0	35.8	49.6	74	-24.4	Peak
4883.3300	48.8	200	3.1	h	32.5	3.1	34.8	49.6	74	-24.4	Peak
2441.5700	35.2	200	3.1	h	28.1	2.0	35.8	29.5	54	-24.5	Ave
2441.5700	34.5	120	1.5	v	28.1	2.0	35.8	28.8	54	-25.2	Ave
2441.5700	53.0	120	1.5	v	28.1	2.0	35.8	47.3	74	-26.7	Peak
1803.8000	55.2	45	2.0	h	25.3	1.9	36.3	46.1	74	-27.9	Peak
1803.8000	35.0	120	2.0	v	25.3	1.9	36.3	25.8	54	-28.2	Ave
1803.8000	34.7	45	2.0	h	25.3	1.9	36.3	25.6	54	-28.4	Ave
11570.6880	3.3	45	2.0	h	39.1	5.4	32.2	15.6	54	-38.4	Ave

Table Cont.

Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15.247			
Frequency MHz	Ampl. dB μ V/m		Direction Degree	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	Comments
High Channel											
5825.9520	116.1	180	2.0	v	34.1	3.4	34.5	119.1			Fund/Peak
5825.9520	96.1	0	3.8	h	34.1	3.4	34.5	99.1			Fund/Peak
5825.9520	100.9	180	3.1	v	34.1	3.4	34.5	103.9			Ave
5825.9520	80.1	0	3.5	h	34.1	3.4	34.5	83.1			Ave
11651.9040	32.6	120	2.0	v	39.1	5.4	32.2	44.9	54	-9.1	Ave
11651.9040	31.8	45	2.0	h	39.1	5.4	32.2	44.1	54	-9.9	Ave
11651.9040	50.9	180	2.0	v	39.1	5.4	32.2	63.2	74	-10.8	Peak
11651.9040	47.2	45	2.0	h	39.1	5.4	32.2	59.5	74	-14.5	Peak
6687.4000	53.2	120	1.5	v	36.5	3.7	35.0	58.4	74	-15.6	Peak
6687.4000	32.7	120	1.5	v	36.5	3.7	35.0	37.9	54	-16.1	Ave
6687.4000	31.6	200	3.1	h	36.5	3.7	35.0	36.8	54	-17.2	Ave
4964.6000	53.5	180	2.0	v	32.5	3.1	34.8	54.3	74	-19.7	Peak
4964.6000	32.8	180	2.0	v	32.5	3.1	34.8	33.6	54	-20.4	Ave
4964.6000	31.4	200	3.1	h	32.5	3.1	34.8	32.2	54	-21.8	Ave
6687.4000	46.7	200	3.1	h	36.5	3.7	35.0	51.9	74	-22.1	Peak
4964.6000	50.5	200	3.1	h	32.5	3.1	34.8	51.3	74	-22.7	Peak
1722.3000	58.5	120	1.5	v	25.3	1.9	36.3	49.4	74	-24.6	Peak
1722.3000	58.4	200	3.1	h	25.3	1.9	36.3	49.3	74	-24.7	Peak
2482.3000	33.8	180	2.0	v	28.1	2.0	35.8	28.1	54	-25.9	Ave
2482.3000	53.5	180	2.0	v	28.1	2.0	35.8	47.8	74	-26.2	Peak
2482.3000	33.5	200	3.1	h	28.1	2.0	35.8	27.7	54	-26.3	Ave
1722.3000	36.5	120	1.5	v	25.3	1.9	36.3	27.4	54	-26.6	Ave
1722.3000	36.3	200	3.1	h	25.3	1.9	36.3	27.2	54	-26.8	Ave
2482.3000	52.0	200	3.1	h	28.1	2.0	35.8	46.3	74	-27.7	Peak

Note:

FUND: Fundamental

AVE: Average

Unintentional Emission

Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15.209		
Frequency MHz	Ampl. dB μ V/m		Direction Degree	Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
33.46	35.30	180	2.6	V	14.9	0.8	28.7	22.3	40	-17.7
33.46	34.10	0	2.0	H	14.9	0.8	28.7	21.1	40	-18.9
570.00	31.50	90	2.0	V	19.3	3.0	28.9	24.9	46	-21.1
570.00	30.60	300	1.8	H	19.3	3.0	28.9	24.0	46	-22.0
98.00	25.60	180	1.5	V	10.4	1.4	28.7	8.7	43.5	-34.8
98.00	23.80	180	2.0	H	10.4	1.4	28.7	6.9	43.5	-36.6

§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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2005-04-14.*

Measurement Results

Base:

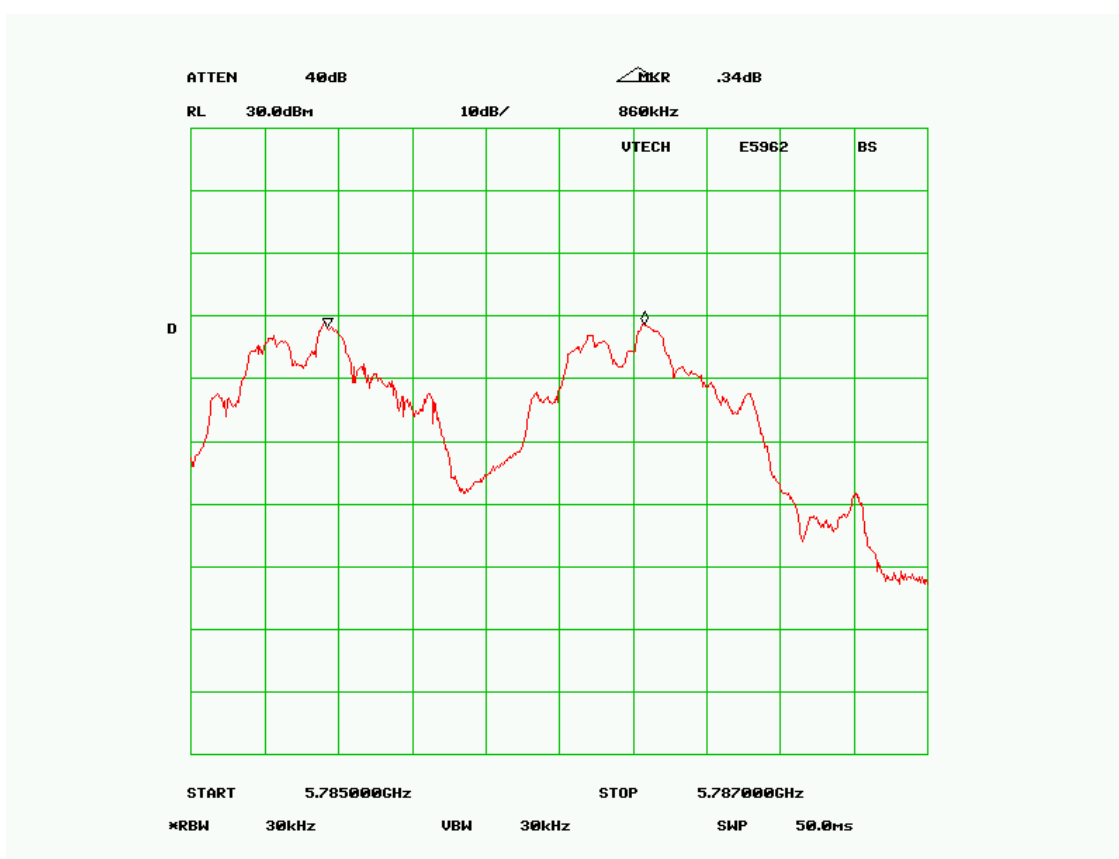
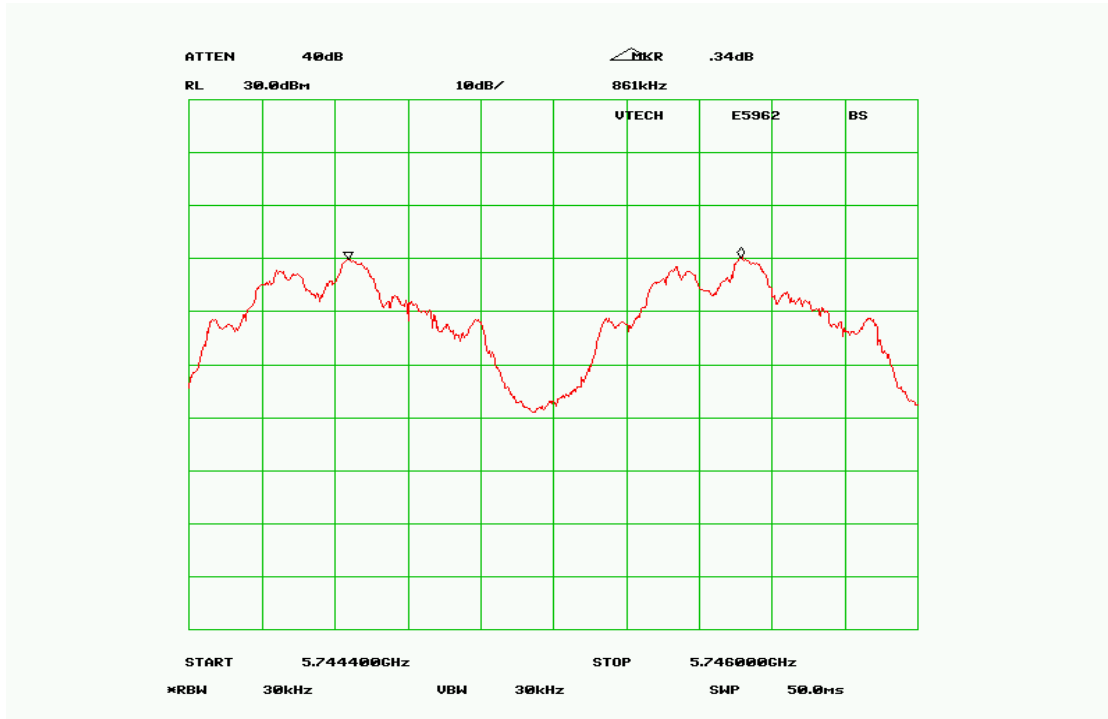
Channel	Frequency MHz	Channel Separation (KHz)
Low	5744.74	861
Mid	5785.34	860
High	8525.95	870

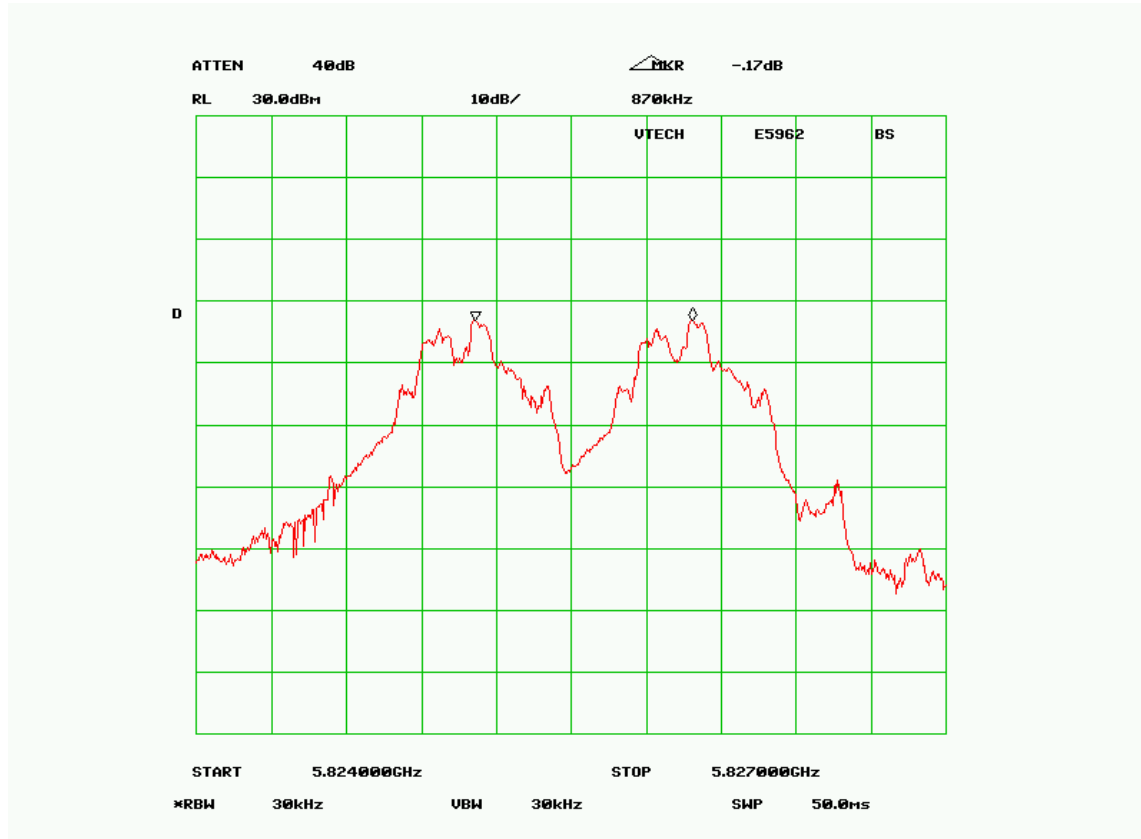
Handset:

Channel	Frequency MHz	Channel Separation (KHz)
Low	5744.74	863
Mid	5785.34	860
High	5825.95	860

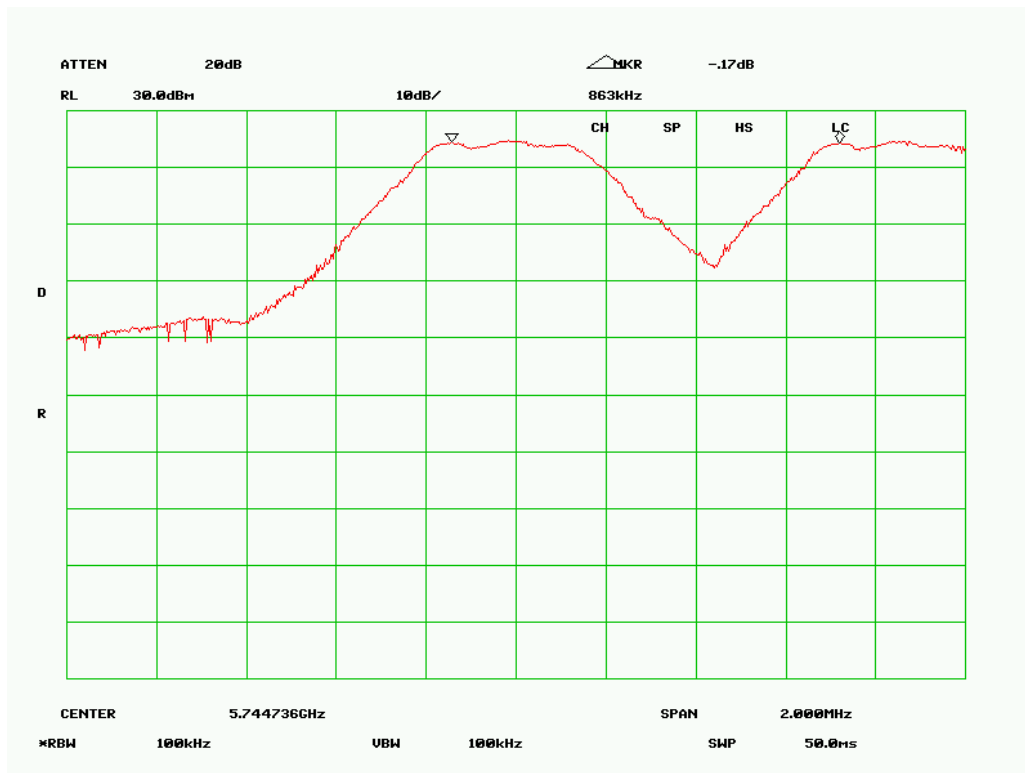
Plots of Hopping Channel Separation

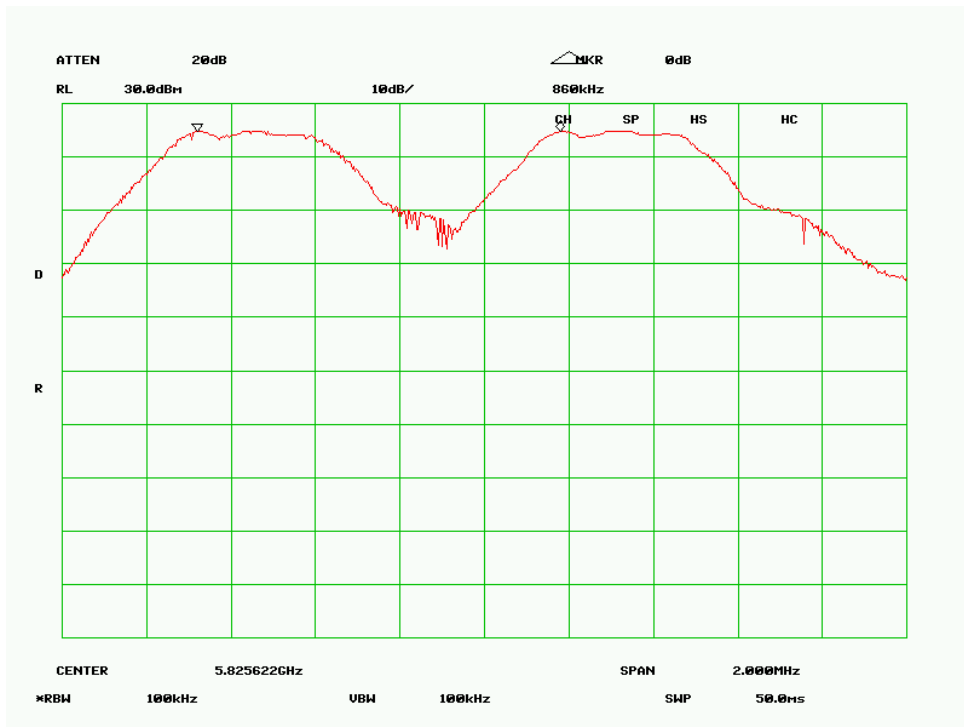
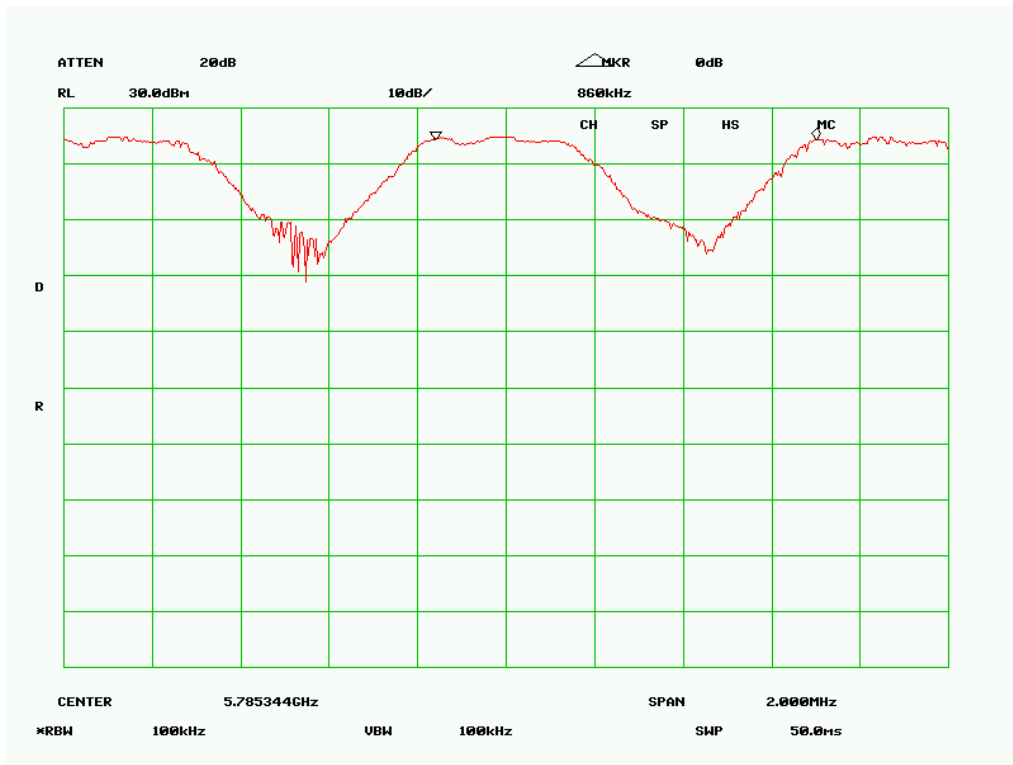
Base:





Handset:





§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

According to §15.247(a)(1), the maximum 20 dB bandwidth of the hopping channel shall be 1 MHz.

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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2005-04-14.*

Measurement Result

Base:

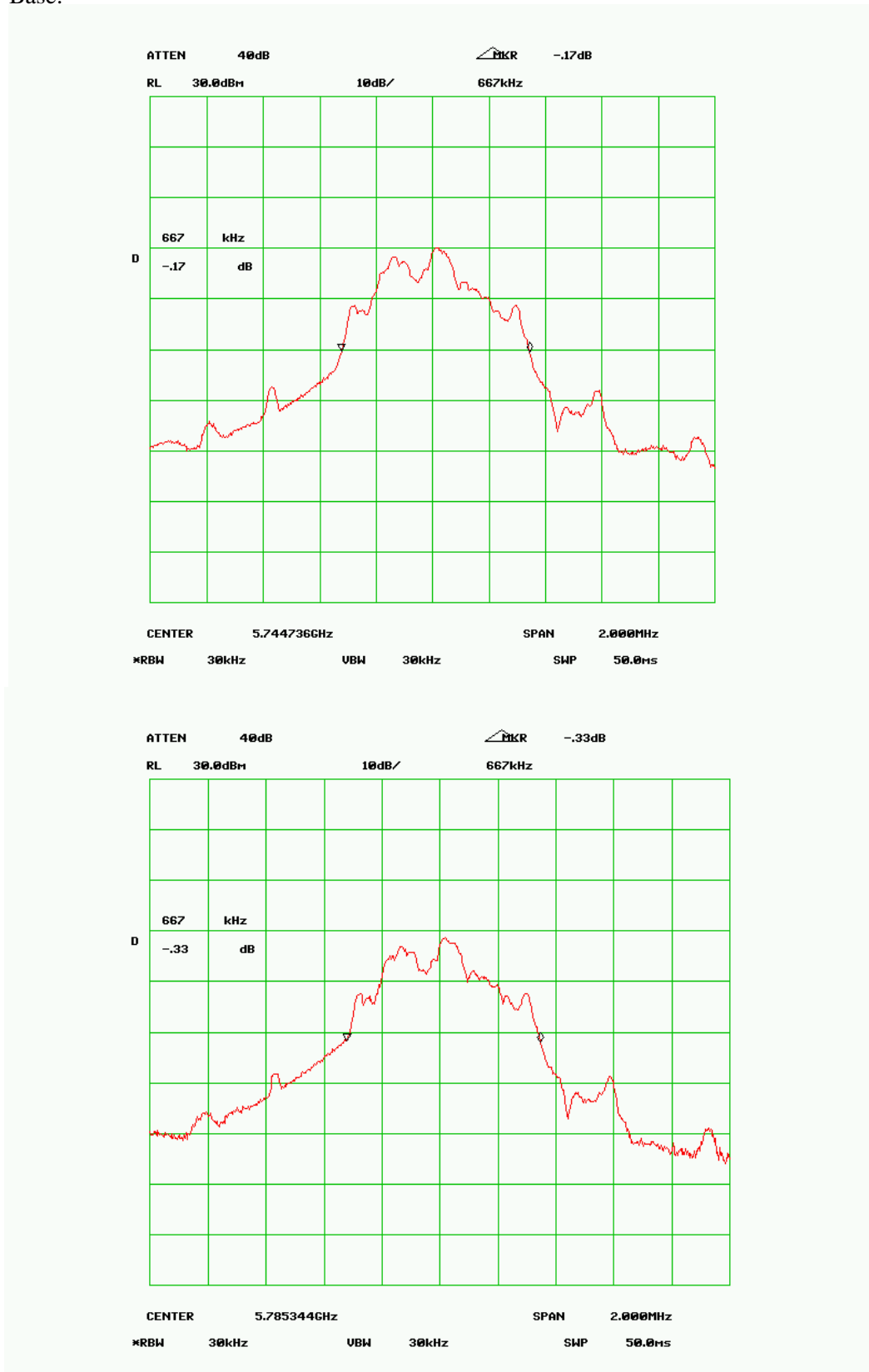
Channel	Frequency MHz	Channel Bandwidth (KHz)
Low	5744.74	667
Mid	5785.34	667
High	5825.95	723

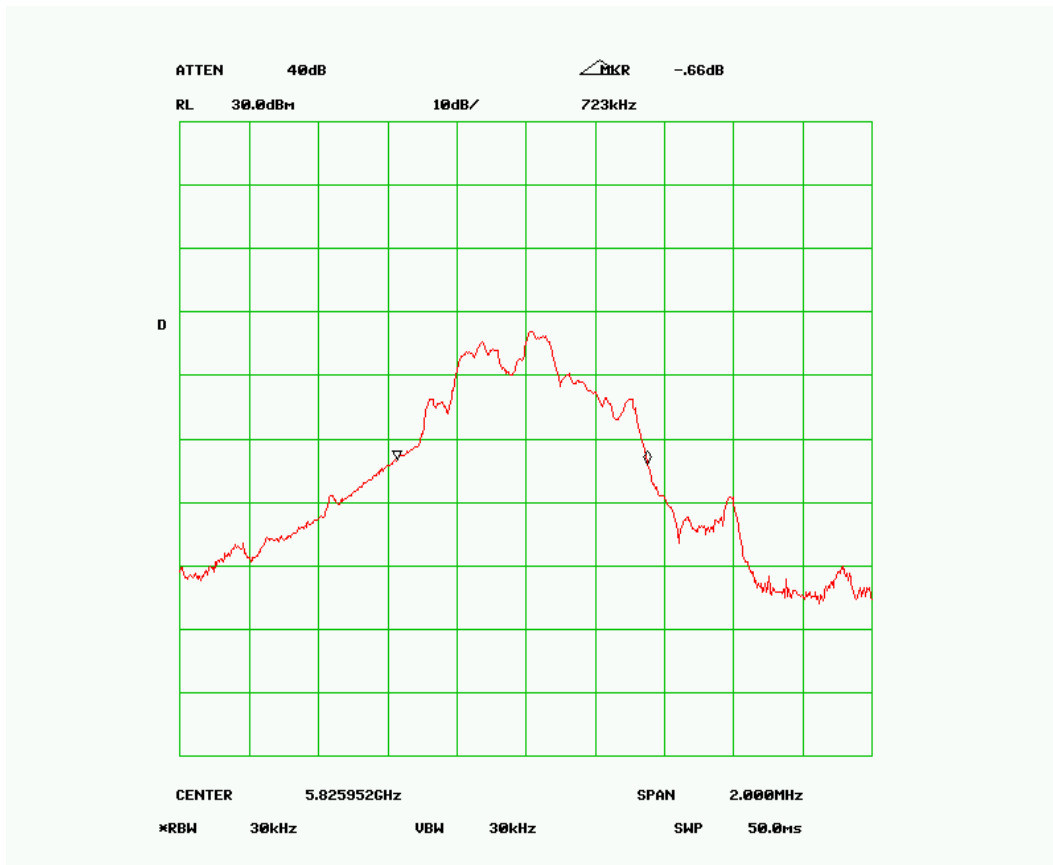
Handset:

Channel	Frequency MHz	Channel Bandwidth (KHz)
Low	5744.74	673
Mid	5785.34	677
High	5825.95	677

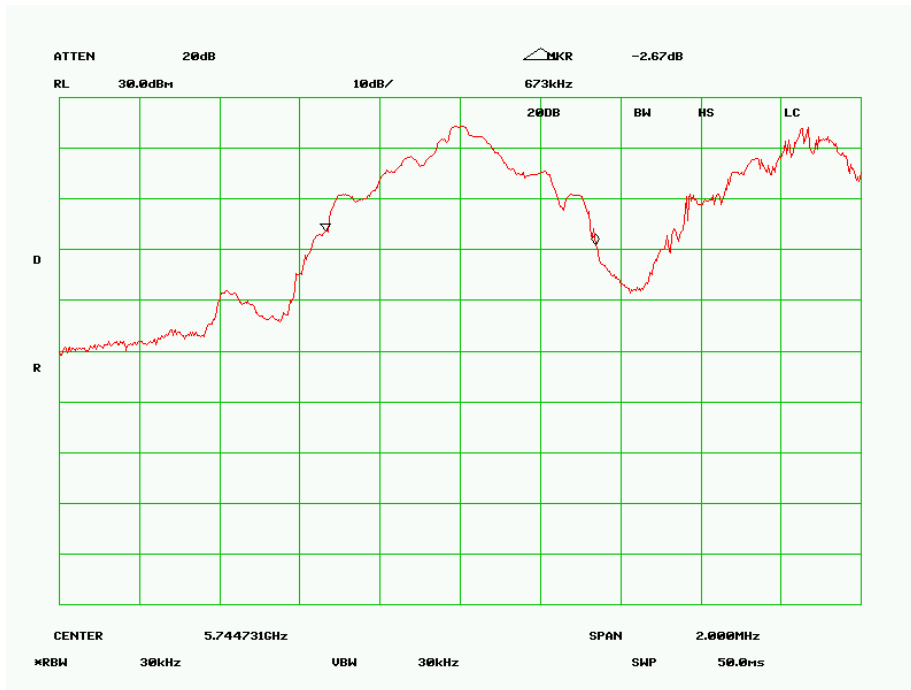
Plot of Channel Bandwidth

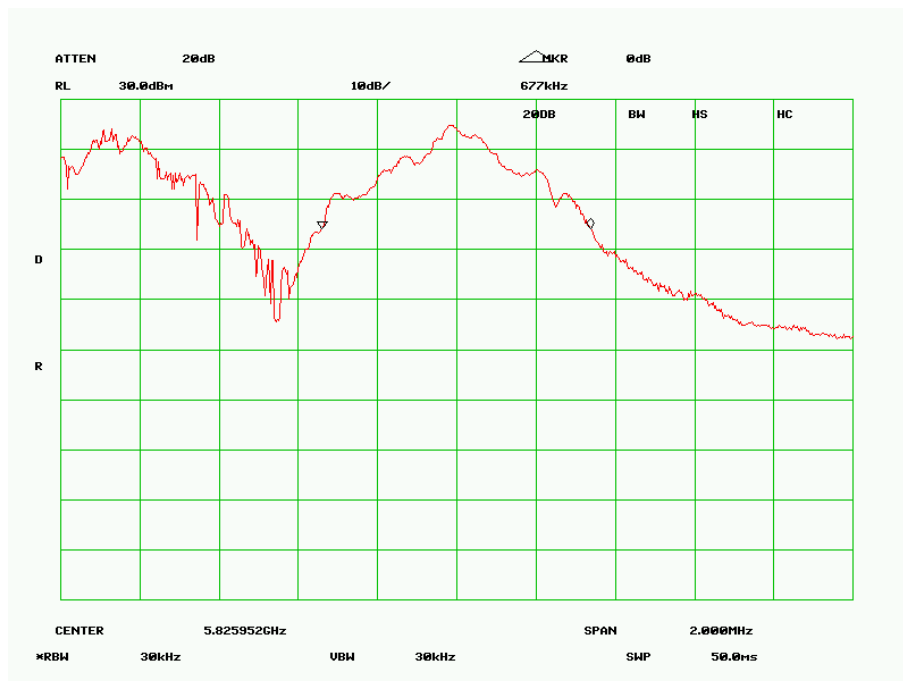
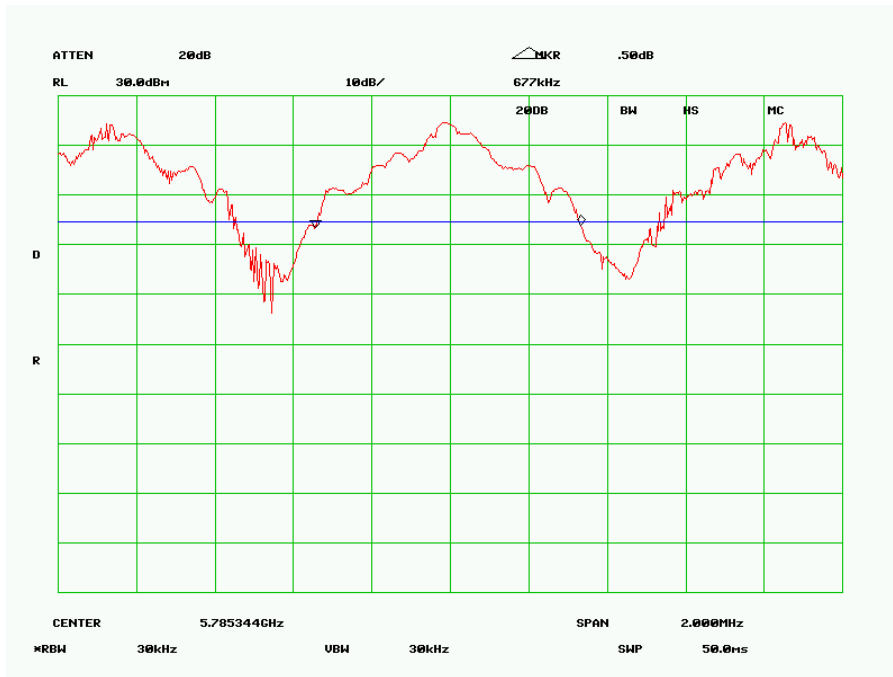
Base:





Handset:





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

Standard Applicable

According to §15.247(a)(1)(ii), frequency hopping systems operating in the 5725-5850MHz 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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

*The testing was performed by Snell Leong on 2005-04-14.

Measurement Results

Base:

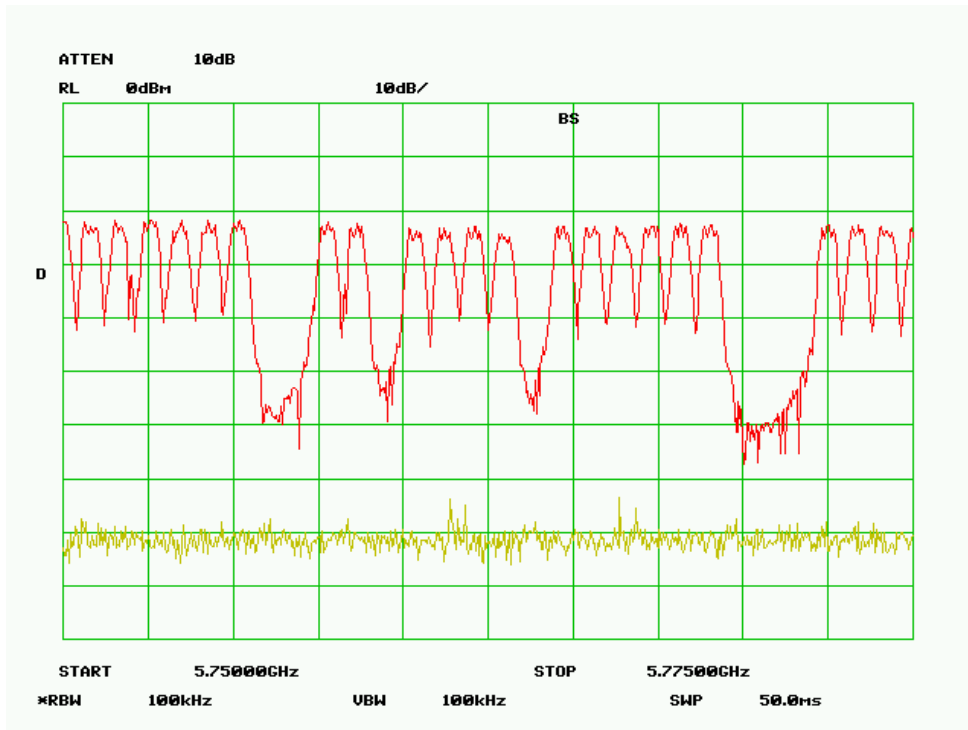
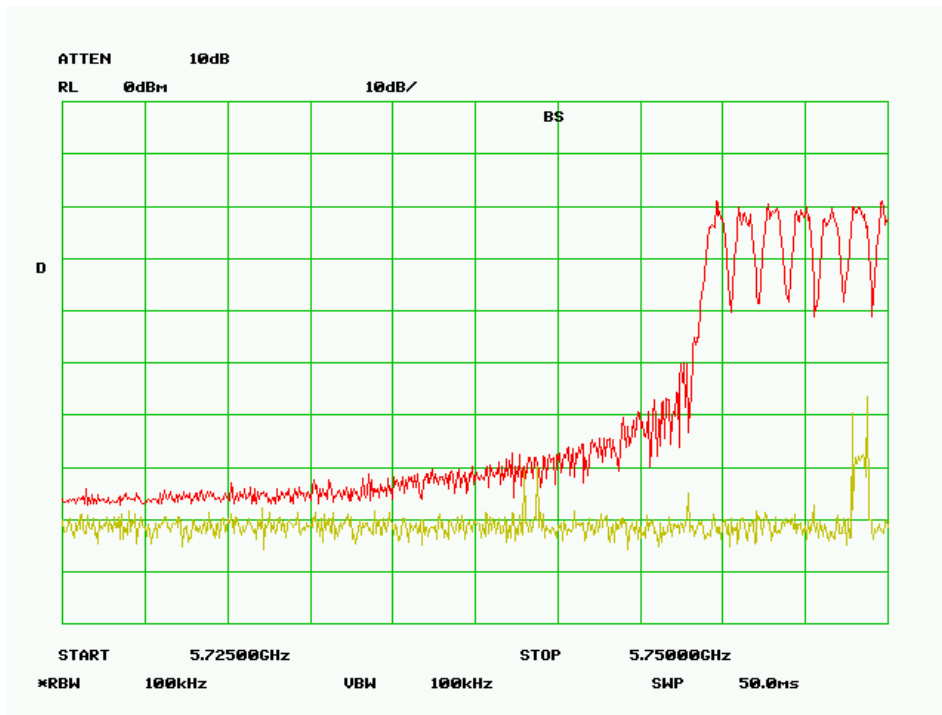
Measurement	Standard	Result
75	75	Compliant

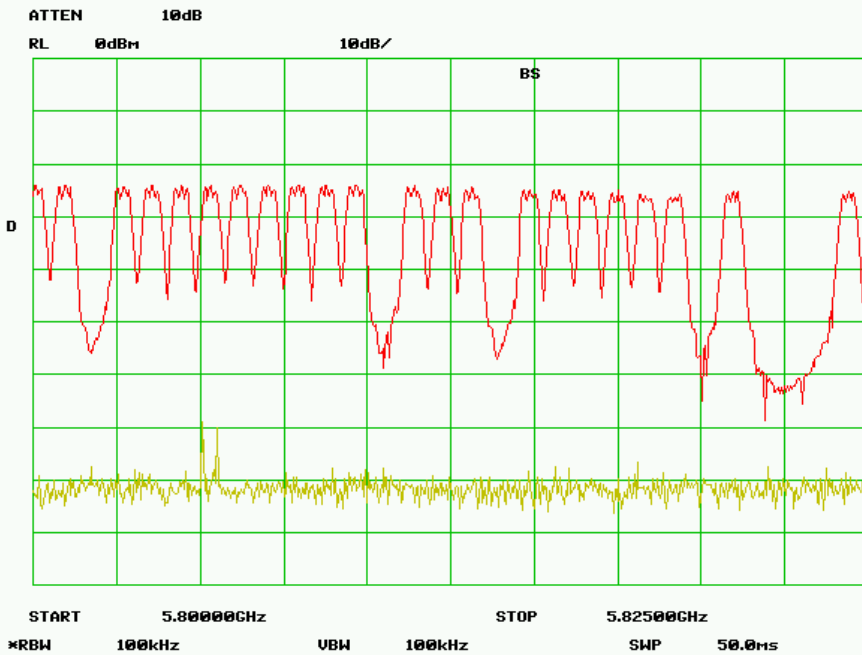
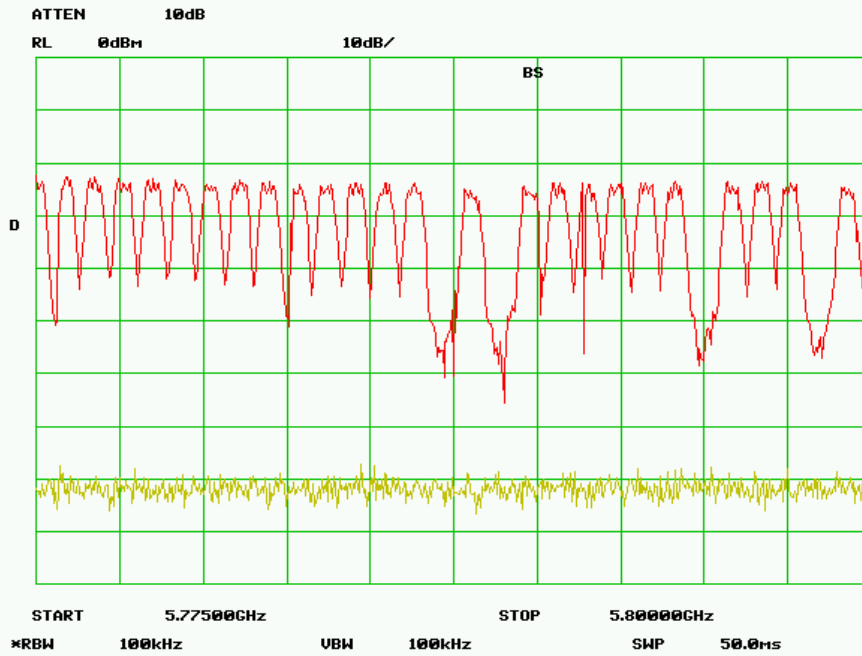
Handset:

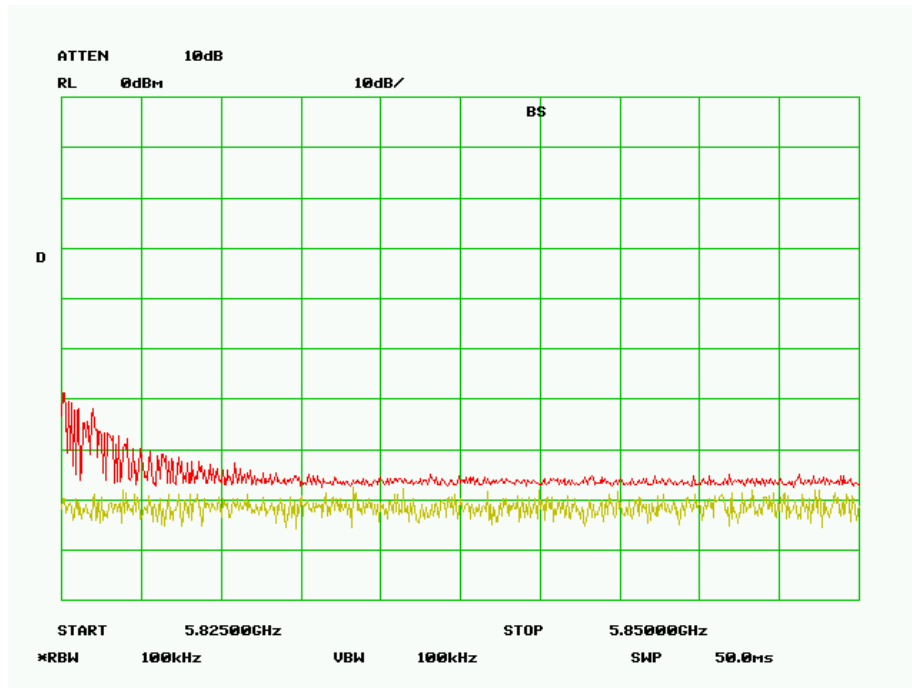
Measurement	Standard	Result
75	75	Compliant

Plots of Number of Hopping Frequency

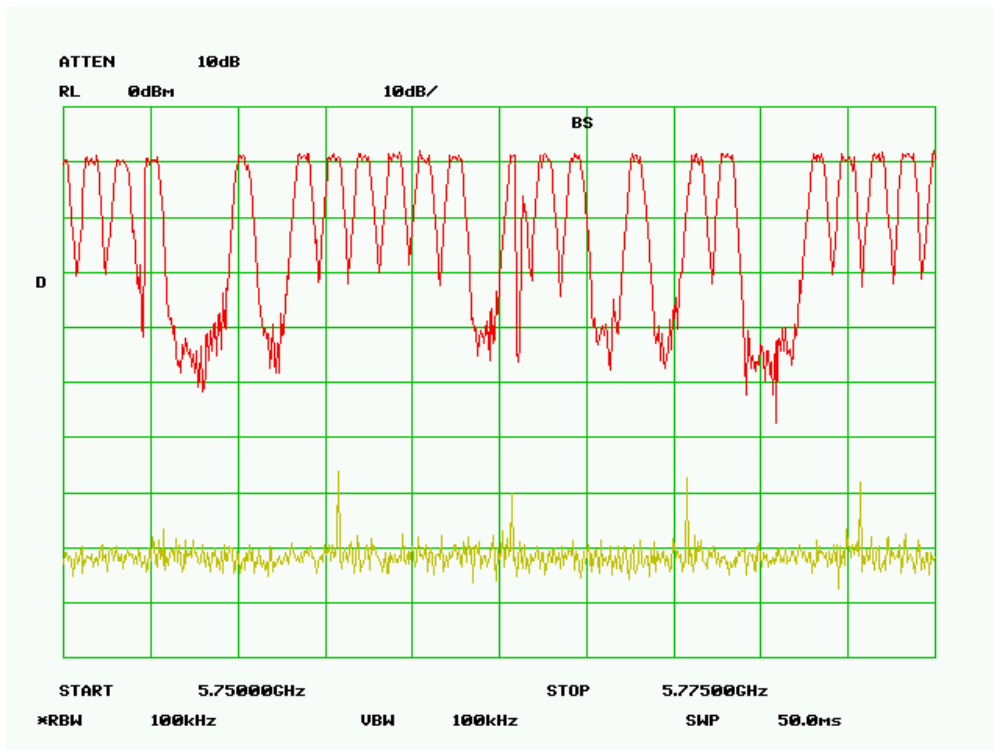
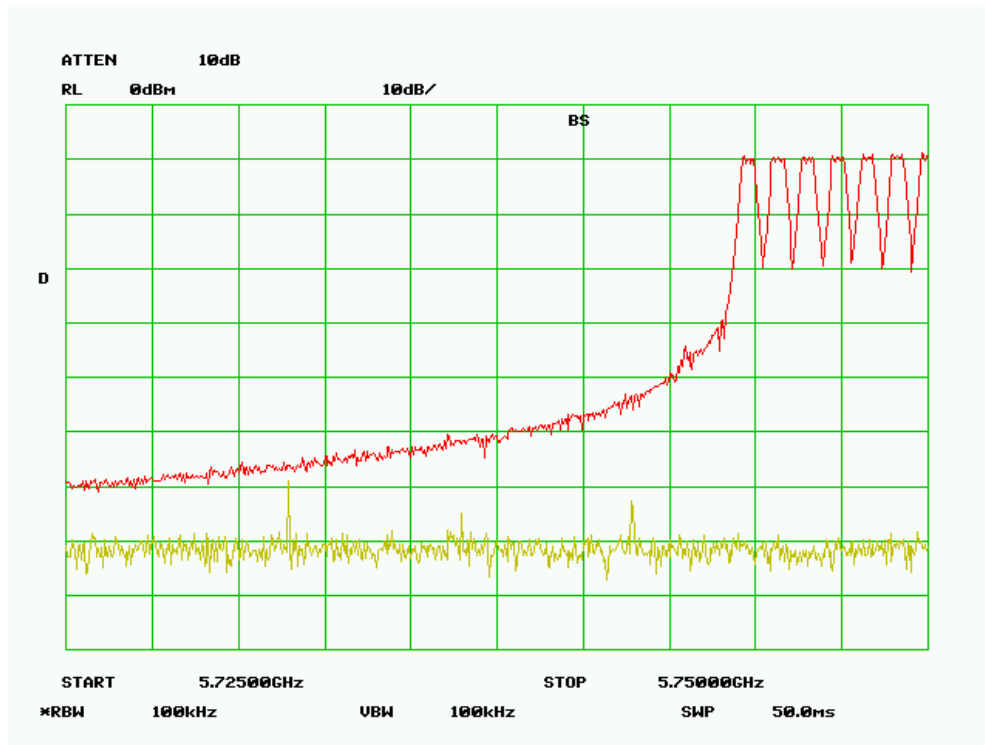
Base:

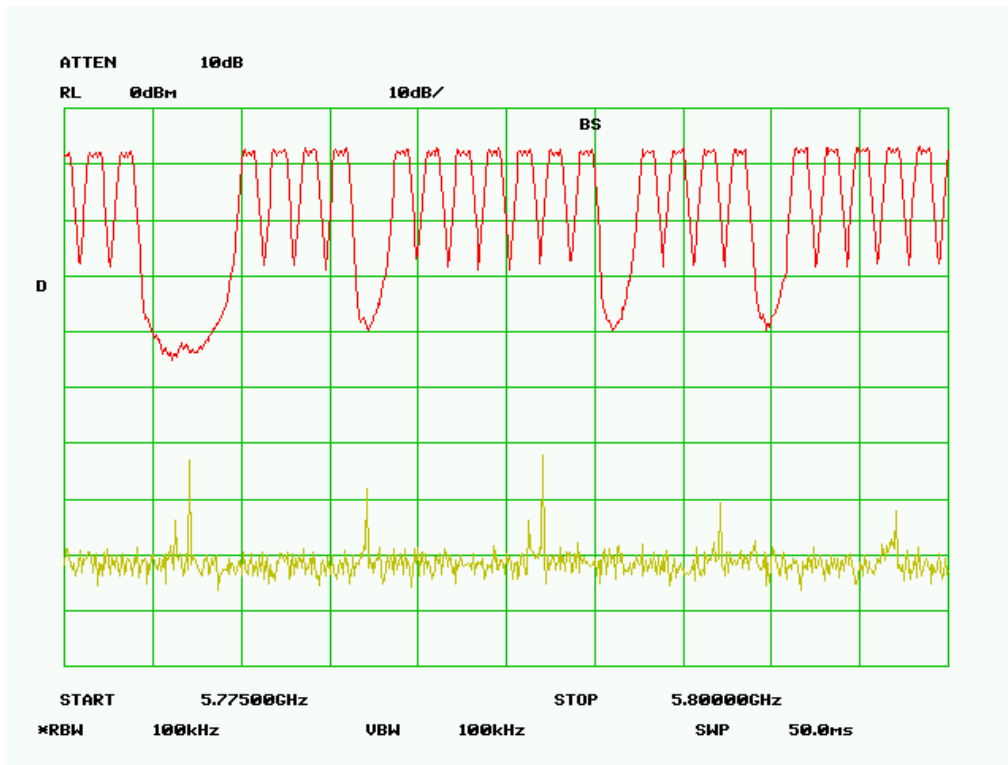


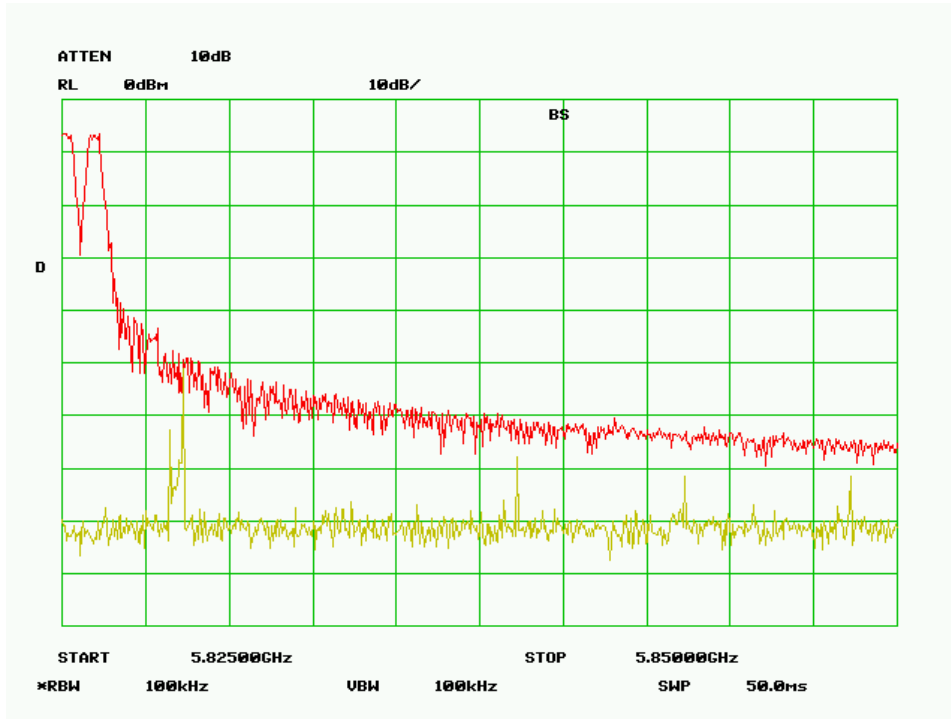




Handset:







§15.247 9 (a) (1) (ii) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(ii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 30 seconds.

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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2005-04-14.*

Measurement Results

Base:

Channel	Frequency MHz	Pulse Wide uSec	Occupied time Per 30 Sec	Dwell Time Sec	Limit Sec
Low	5744.74	900.0	40	0.036	0.4
Mid	5785.34	883.3	40	0.035	0.4
High	5825.95	908.3	40	0.036	0.4

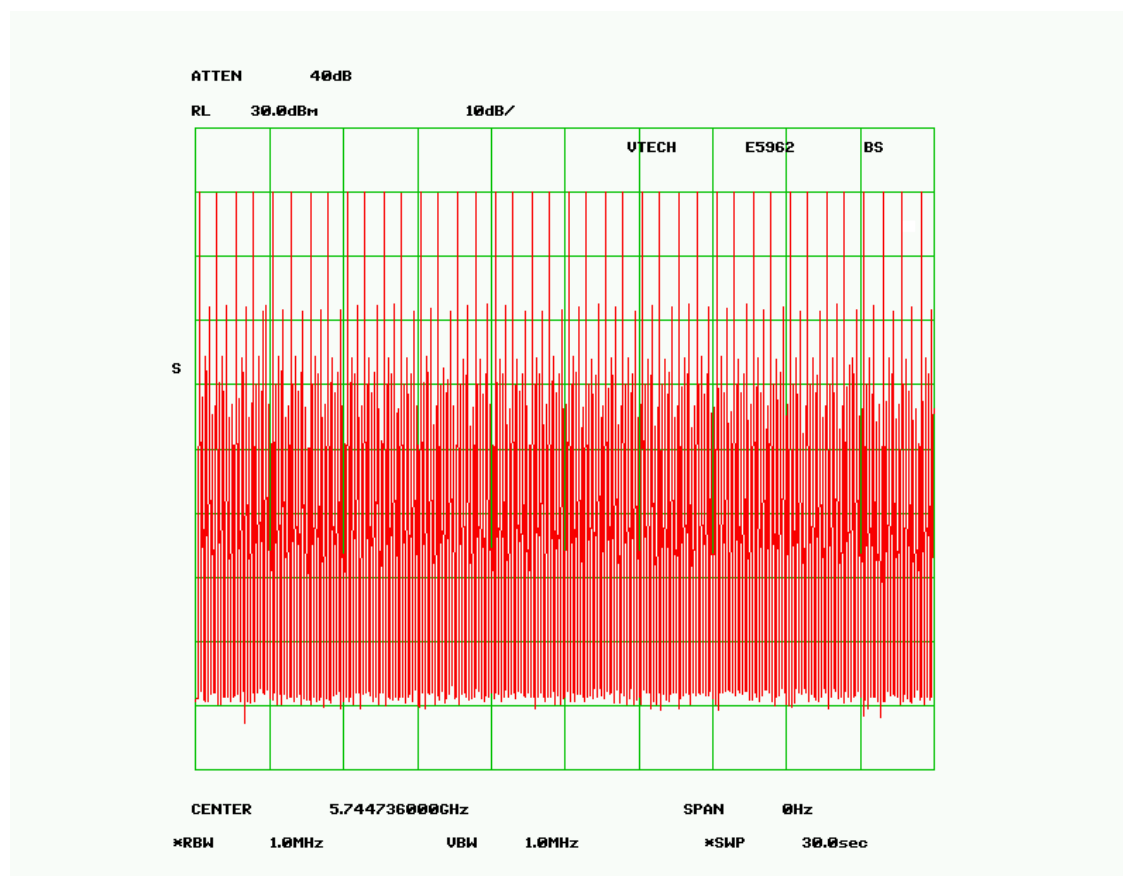
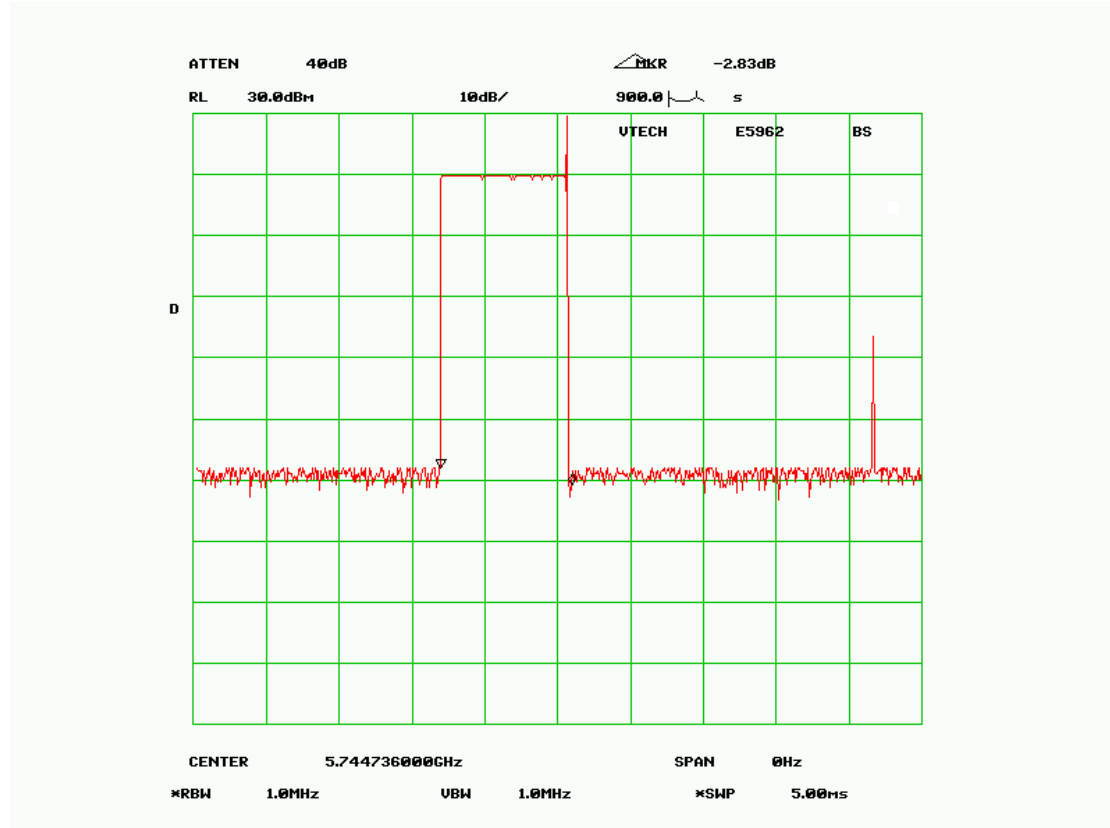
Handset:

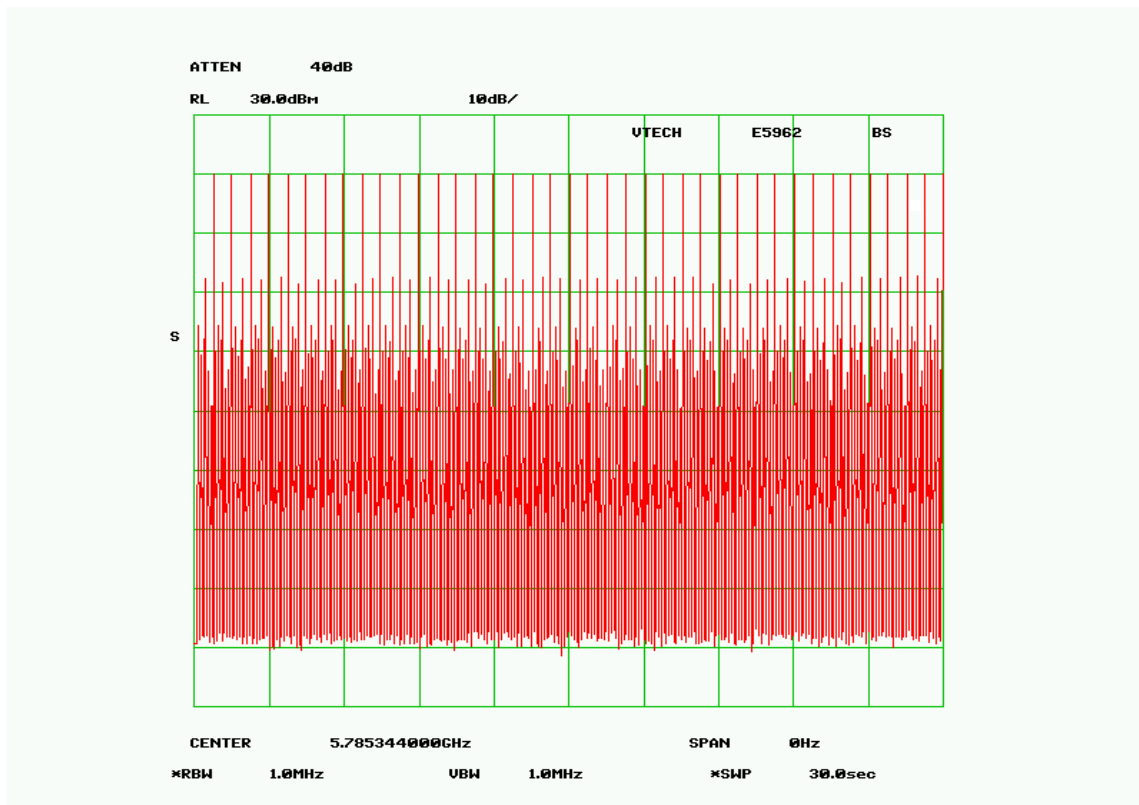
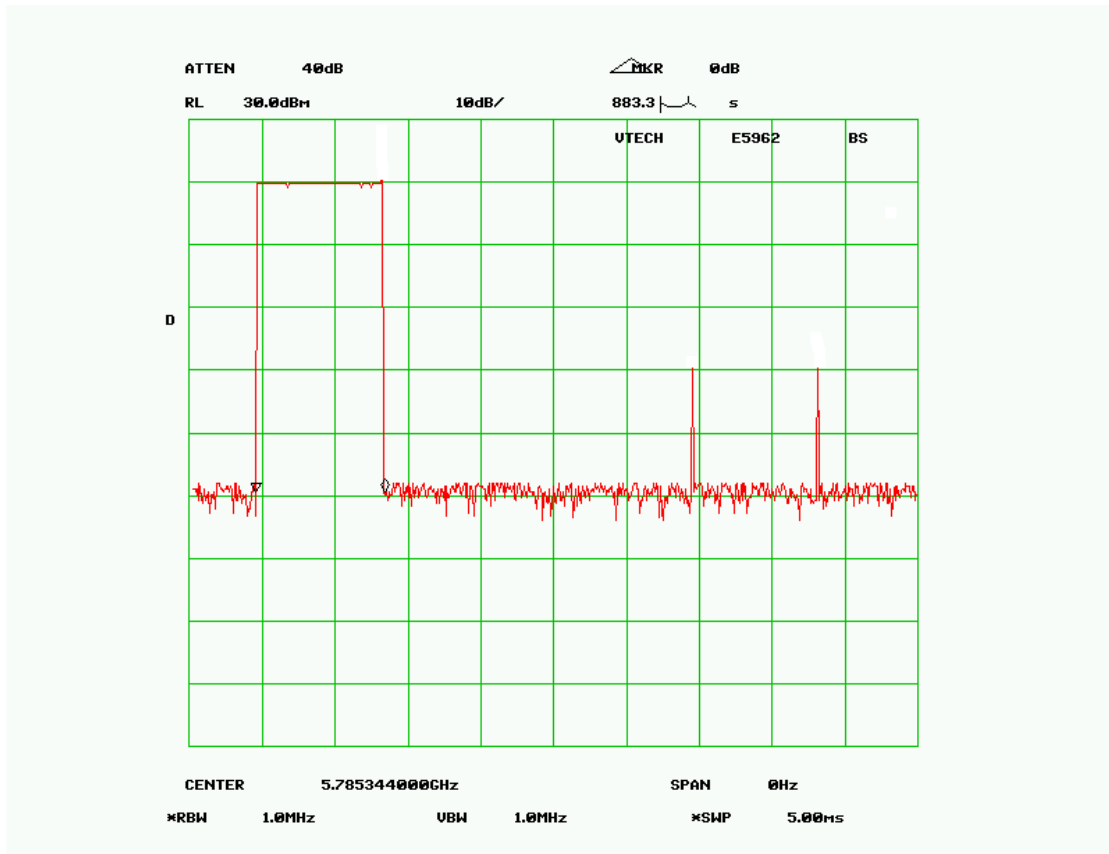
Channel	Frequency MHz	Pulse Wide uSec	Occupied time per 30 Sec	Dwell Time Sec	Limit Sec
Low	5744.74	900.0	40	0.036	0.4
Mid	5785.34	916.0	40	0.037	0.4
High	5825.95	883.3	40	0.035	0.4

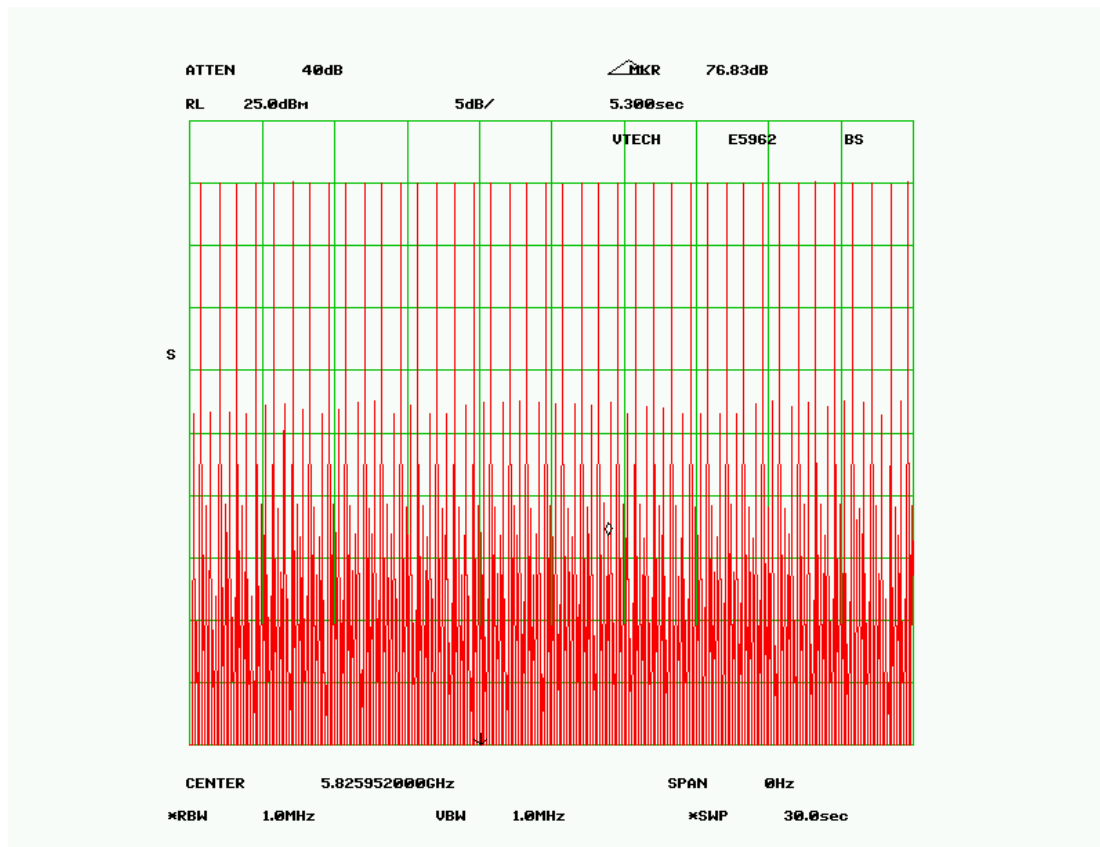
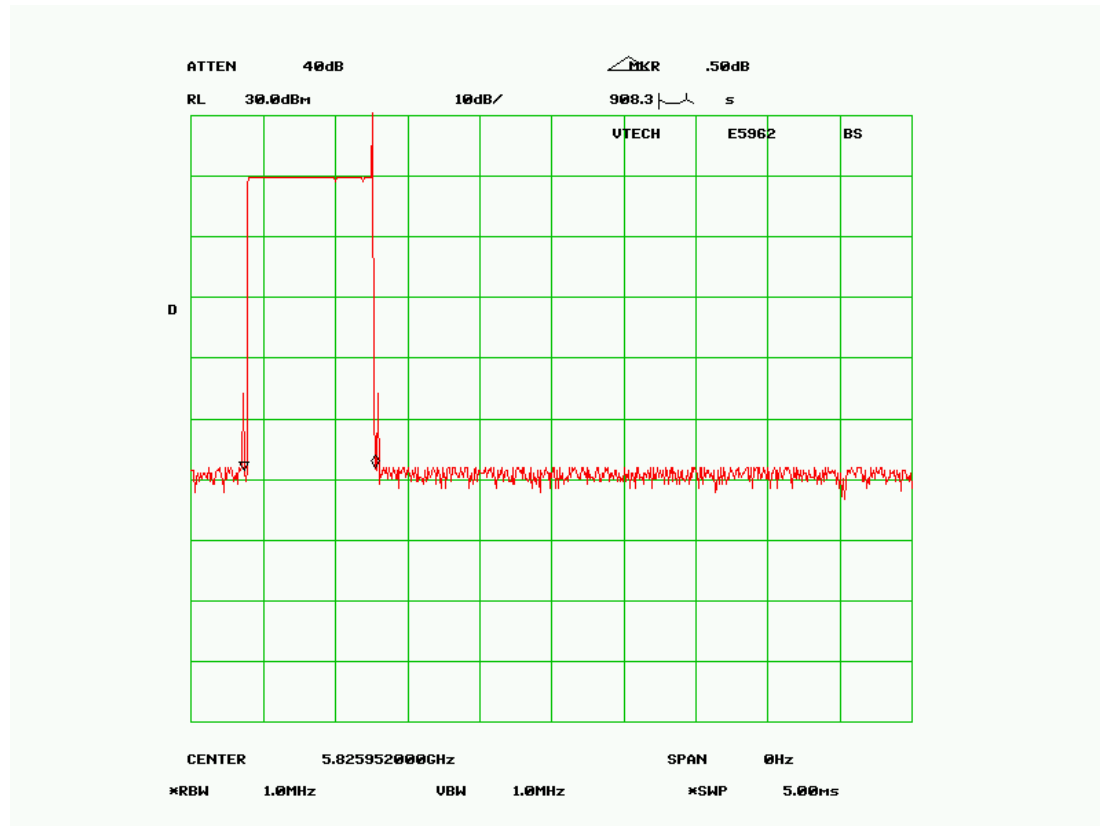
Plots of Dwell Time

Please refer the following plots.

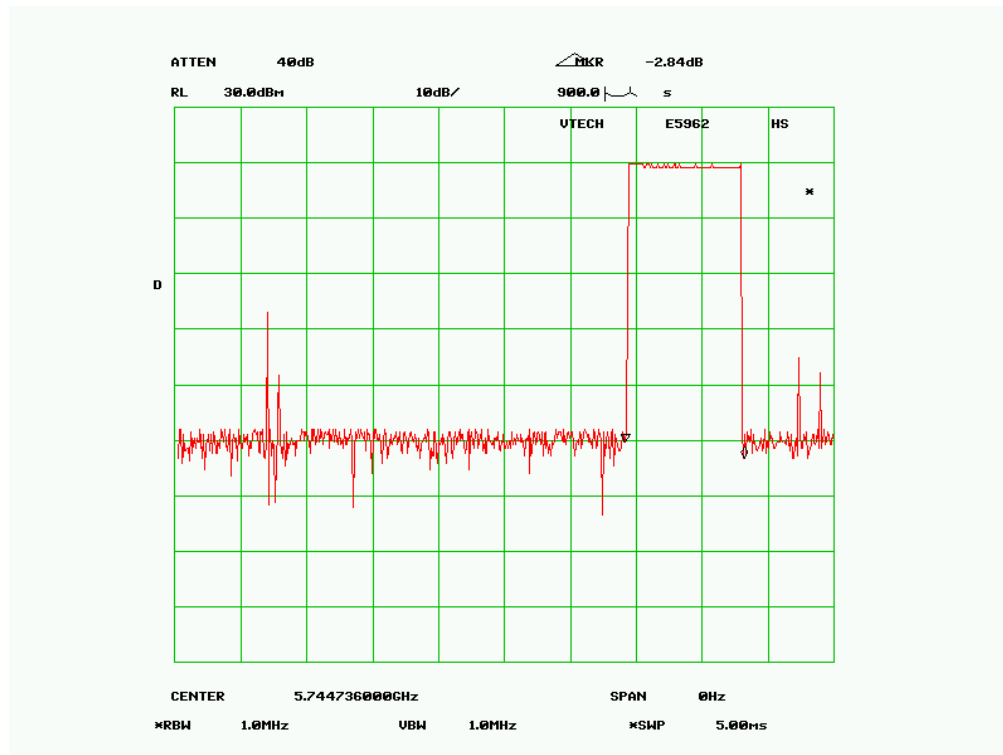
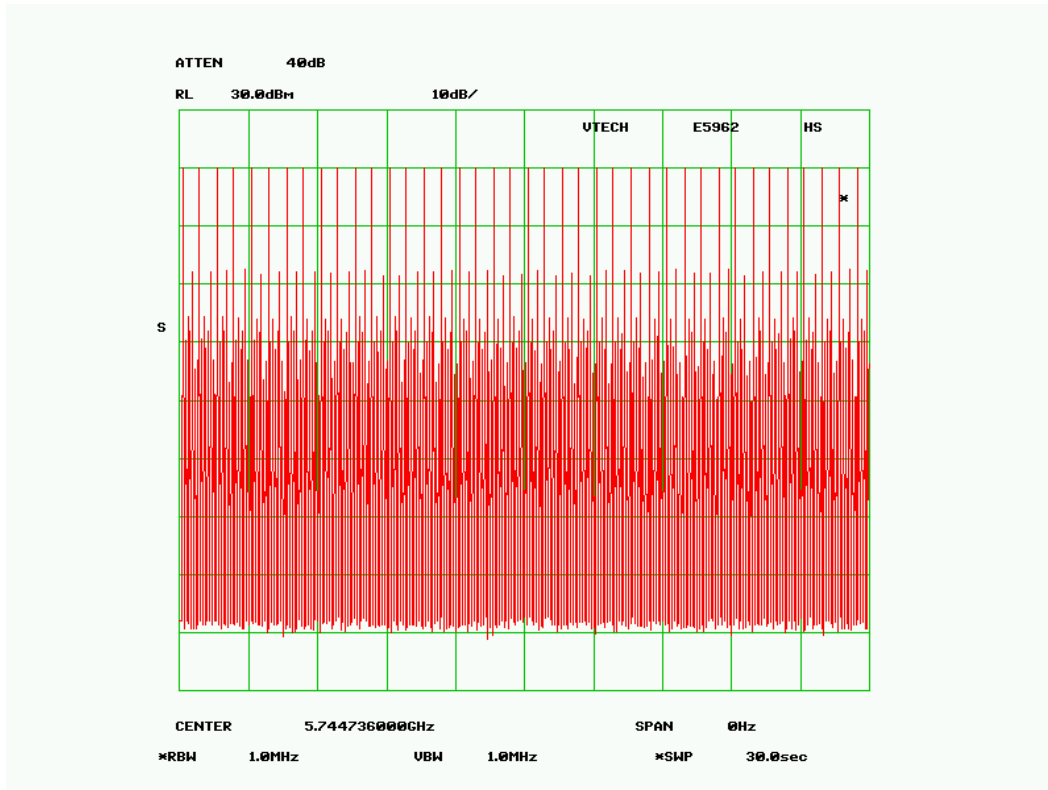
Base:

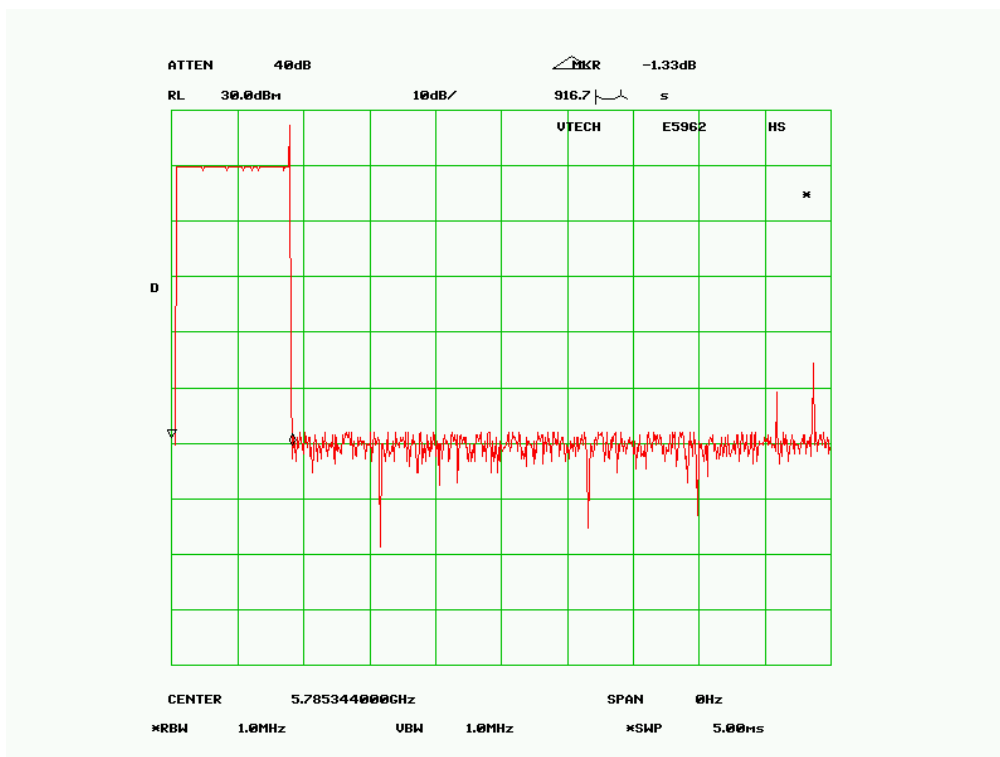
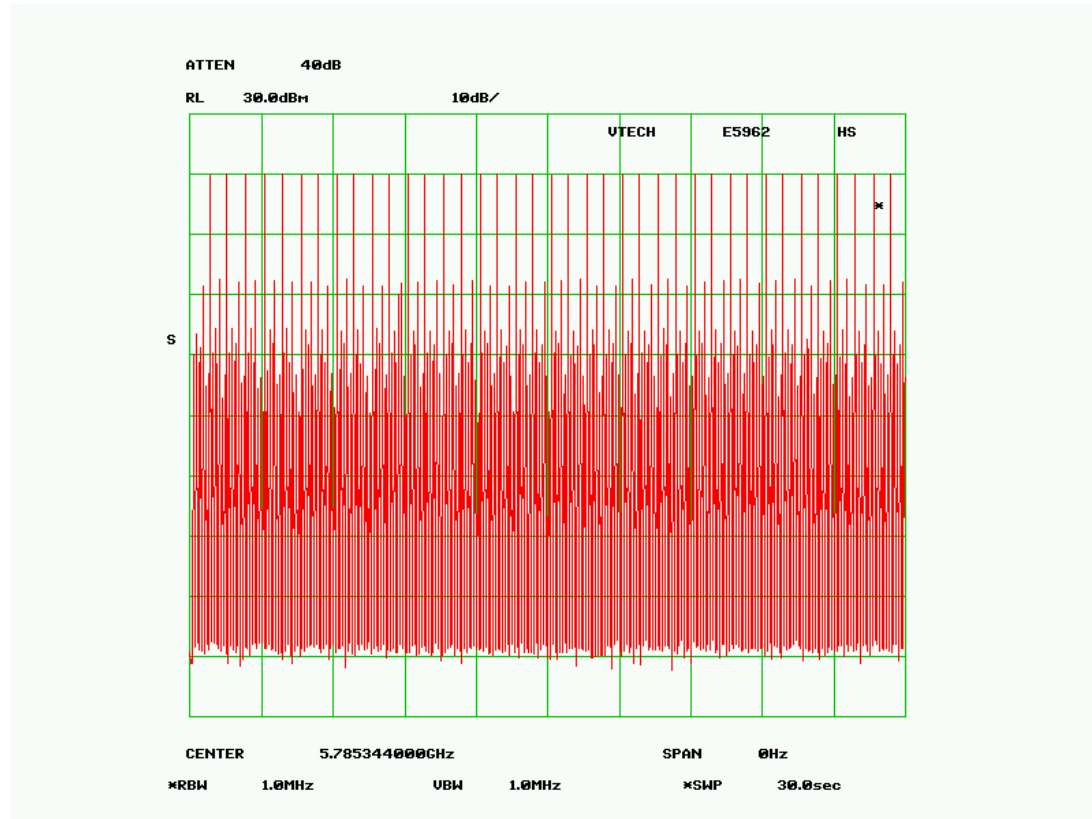


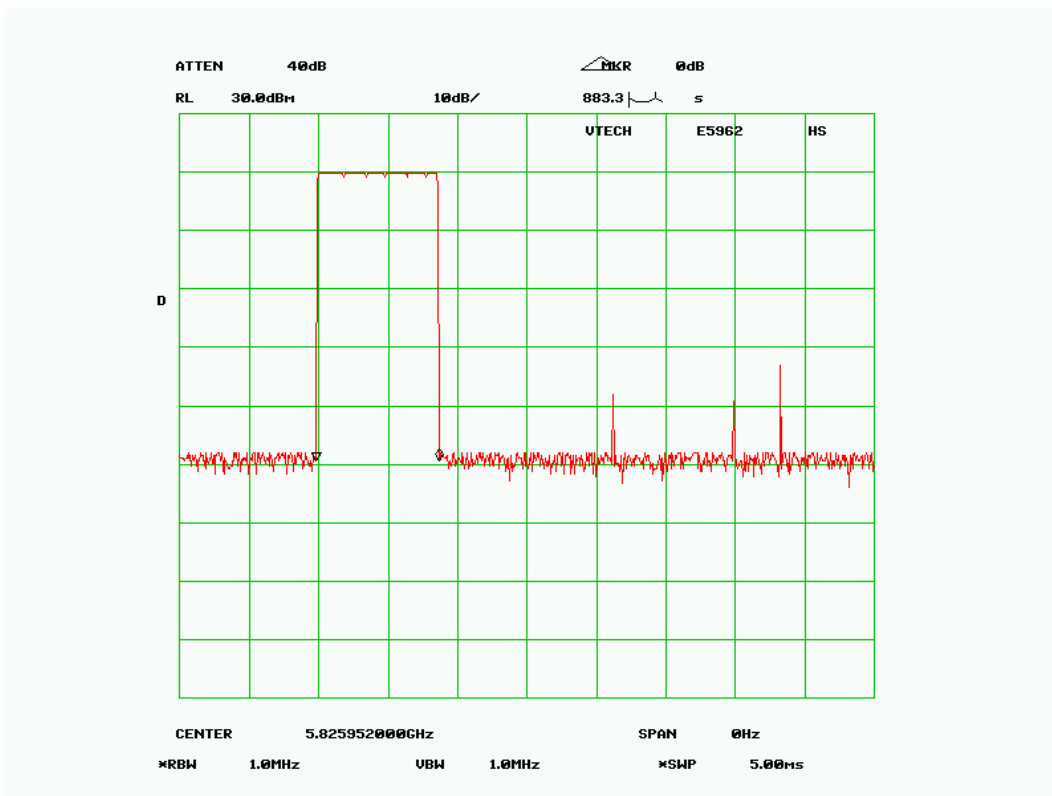
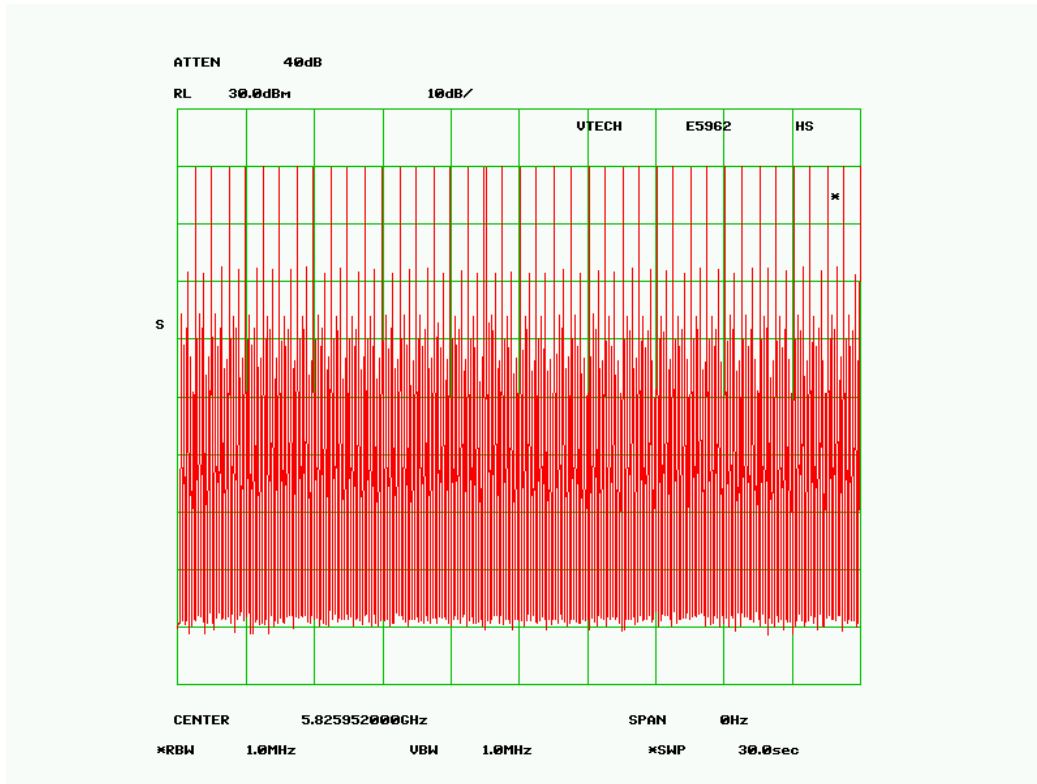




Handset:







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

Standard Applicable

According to §15.247(b) (1), for all frequency hopping systems in the 5725-5850 MHz band, 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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

*The testing was performed by Snell Leong on 2005-04-14.

Measurement Result

Base:

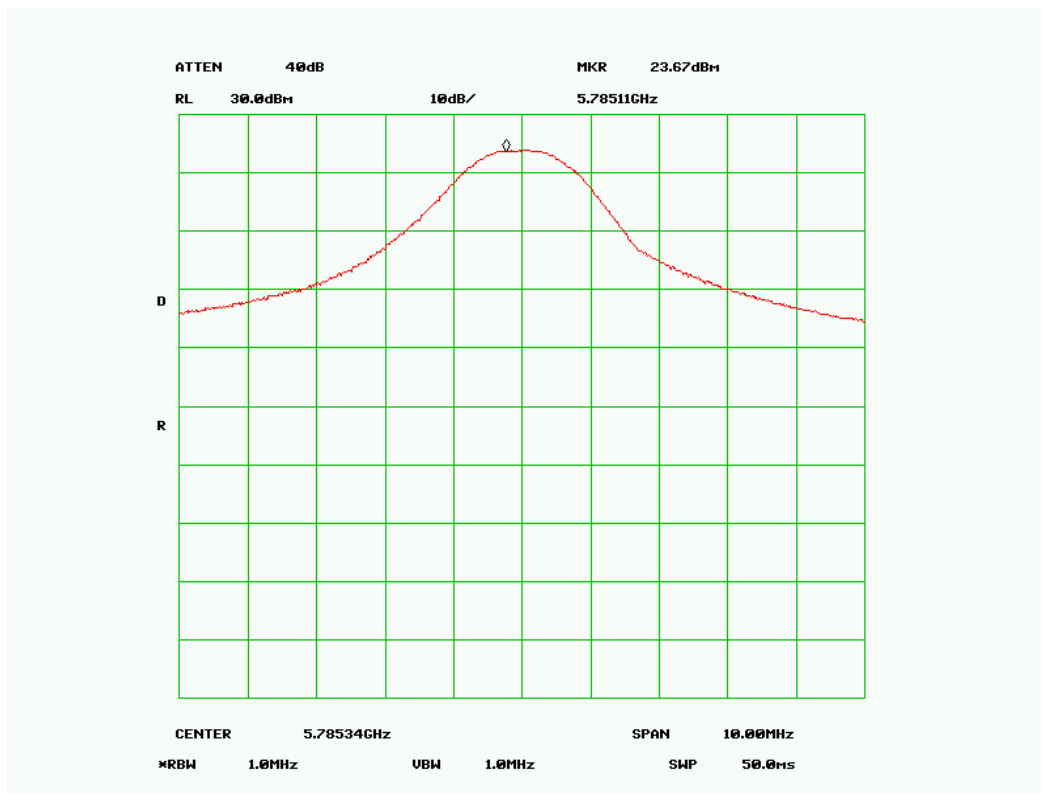
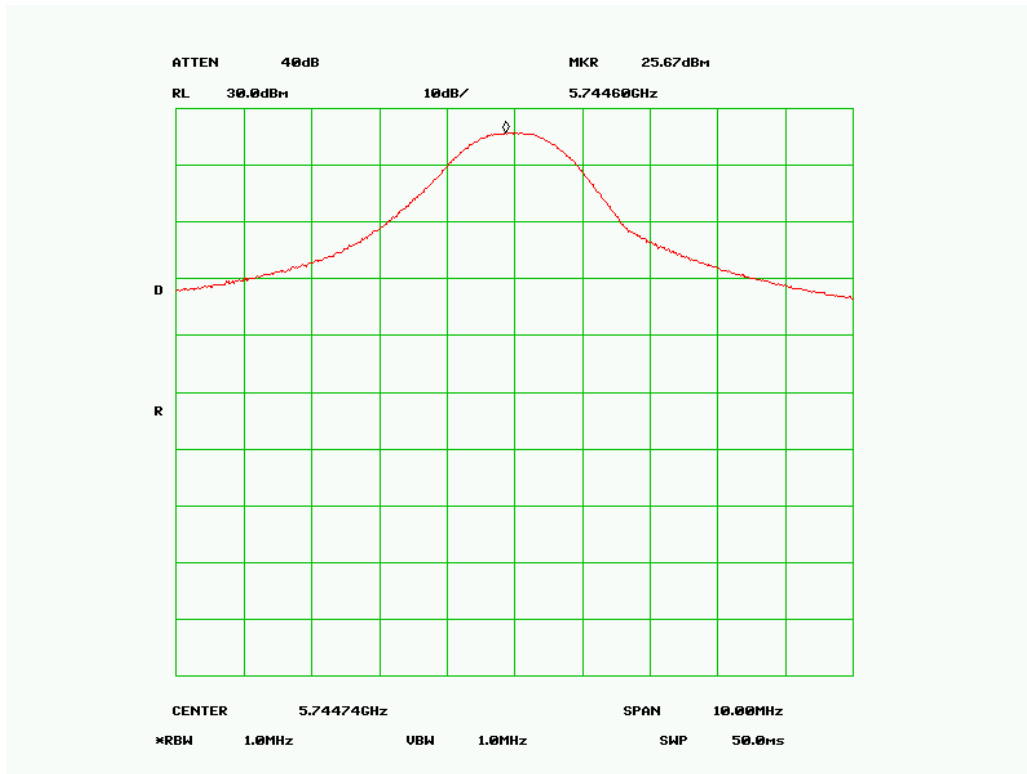
Channel	Frequency MHz	Max Peak Output Power		Limit (m Watt)	Result
		(dBm)	(m Watt)		
Low	5744.74	25.67	368.98	1000	pass
Mid	5785.34	23.67	232.81	1000	pass
High	5825.95	21.67	146.89	1000	pass

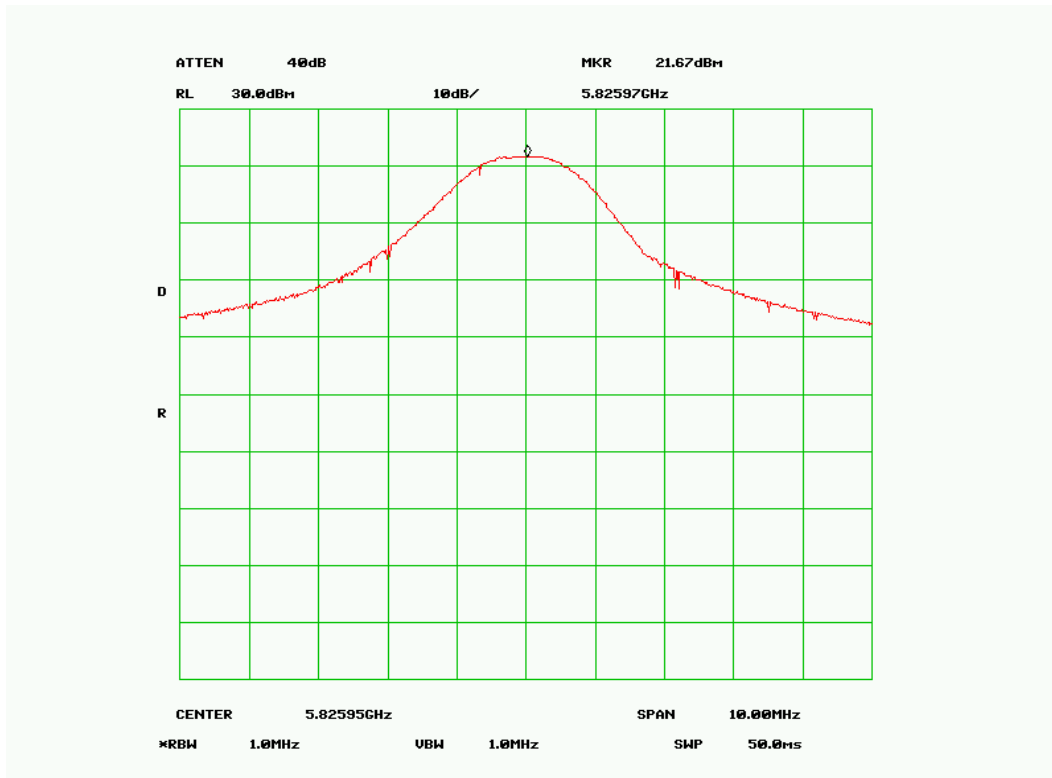
Handset:

Channel	Frequency MHz	Max Peak Output Power		Limit (m Watt)	Result
		(dBm)	(m Watt)		
Low	5744.74	25	316.23	1000	pass
Mid	5785.34	25.17	328.85	1000	pass
High	5825.95	25.33	341.19	1000	pass

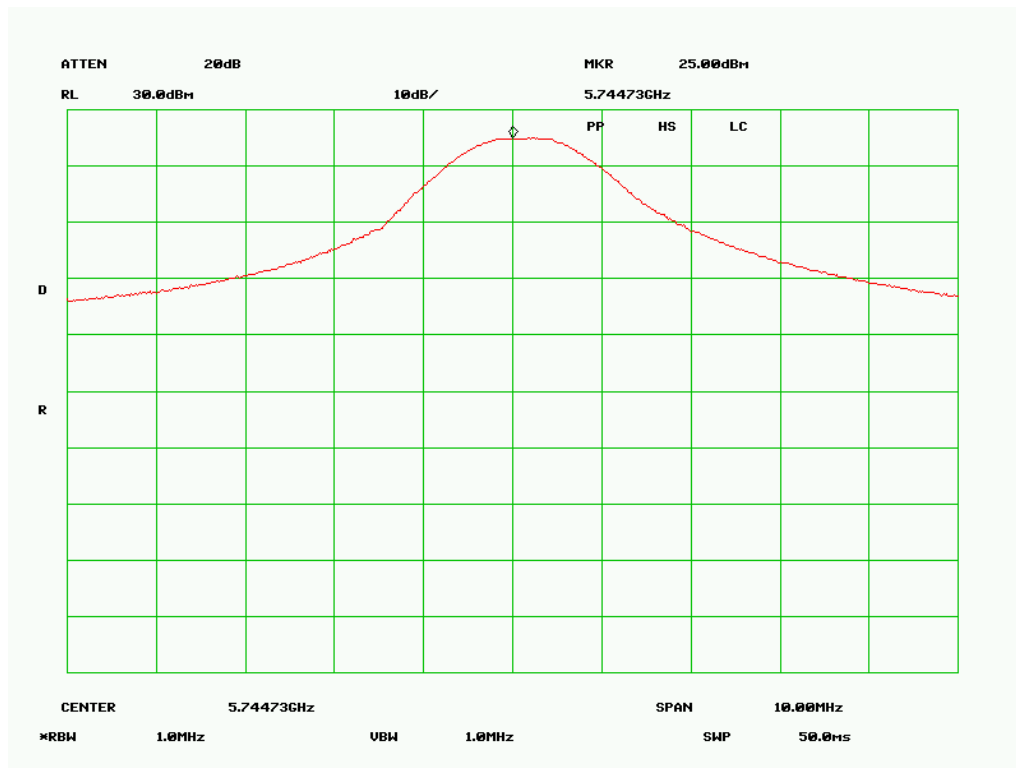
Plots of Maximum Peak Output Power

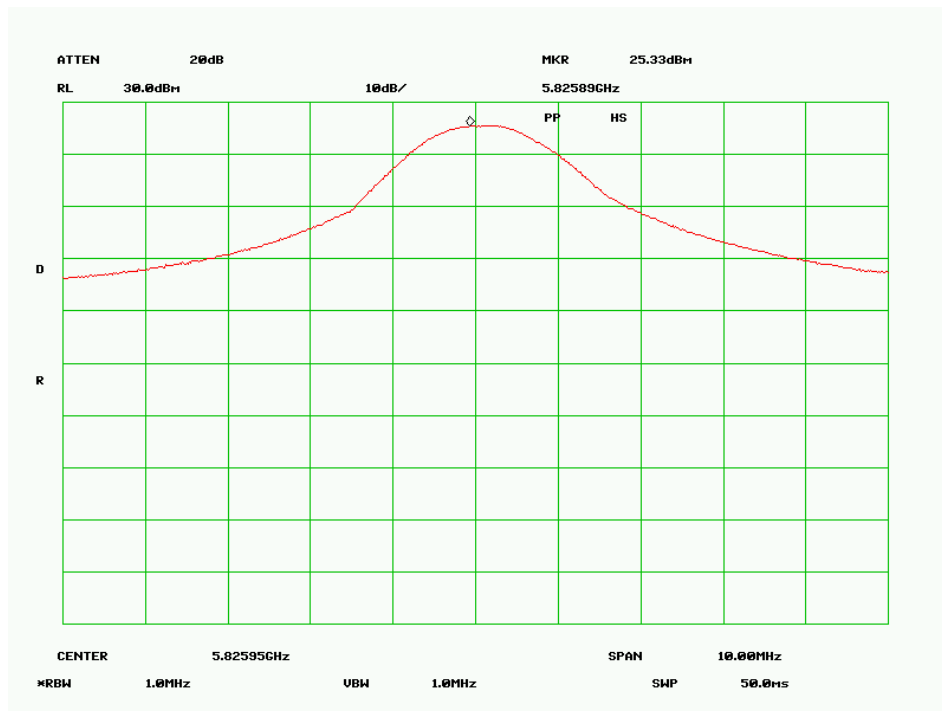
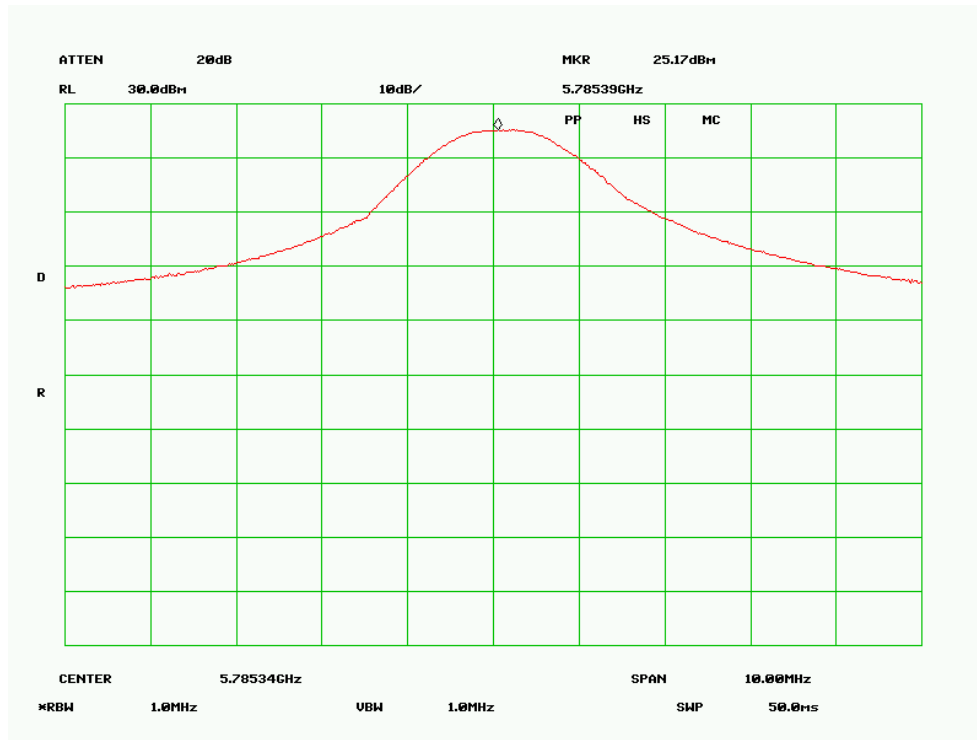
Base:





Handset:





§15.247 (e)(i) - RF EXPOSURE

According to §15.247(e)(i) 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 Permissible 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: 25.67 (dBm)

Maximum peak output power at antenna input terminal: 368.98 (mW)

Prediction distance: 20 (cm)

Predication frequency: 5800 (MHz)

Antenna Gain (typical): 0 (dBi)

Maximum antenna gain: 1(numeric)

Power density at predication frequency at 20 cm: 0.073(mW/cm²)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm²)

Test Result

The predicted power density level at 20 cm is 0.073 mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 5800 MHz. The base of the EUT is used at least 20cm away from user's body. It is determined as mobile equipment.

§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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

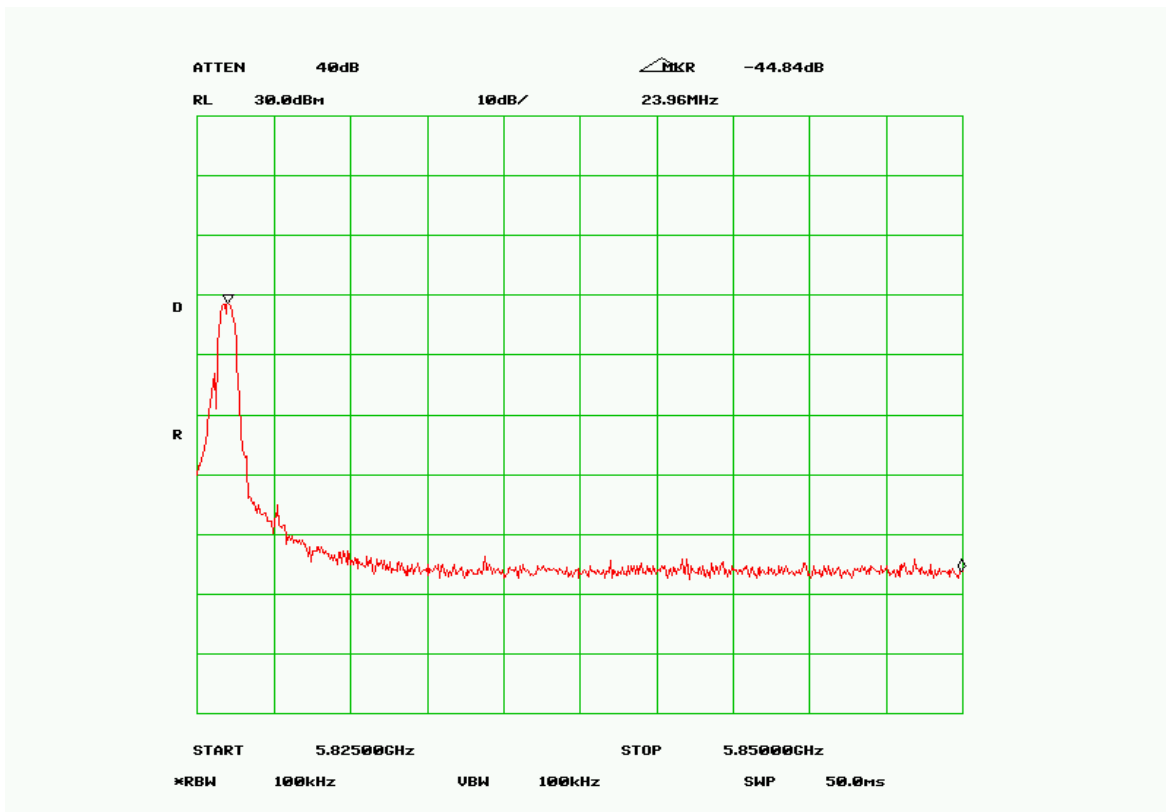
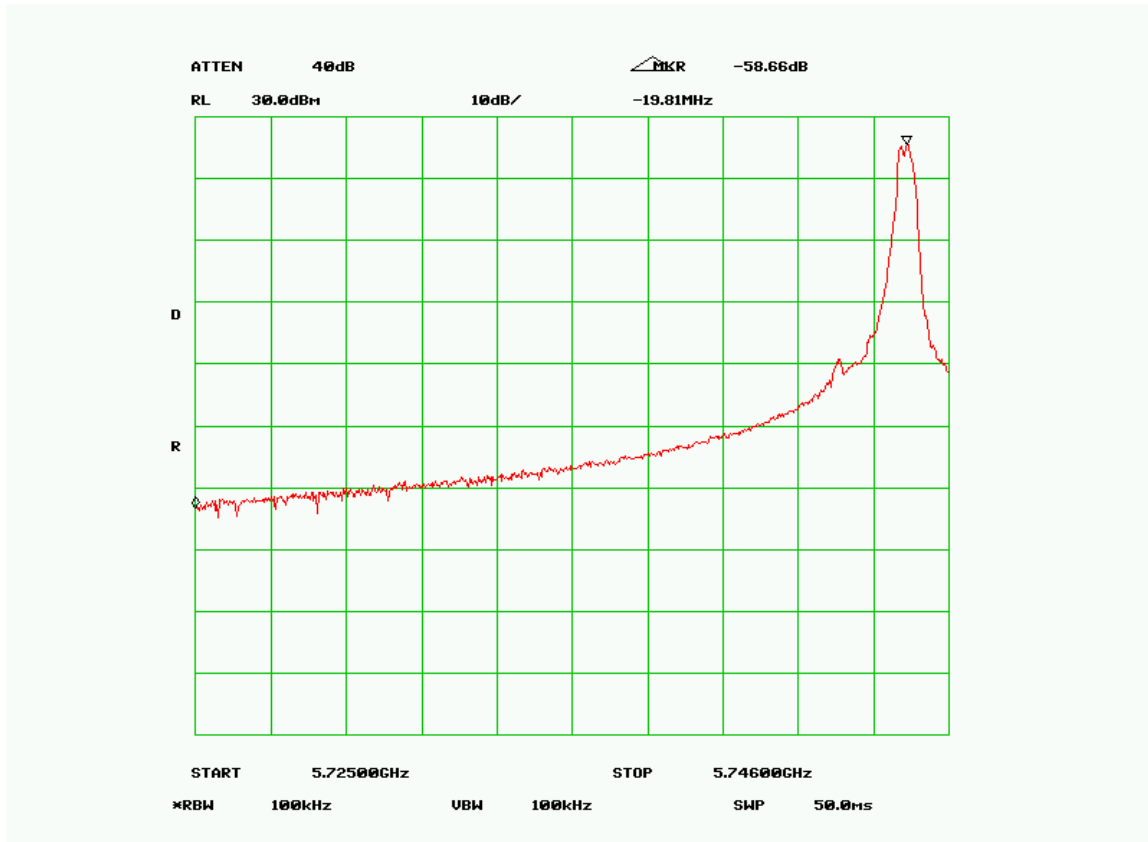
Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

**The testing was performed by Snell Leong on 2005-04-14.*

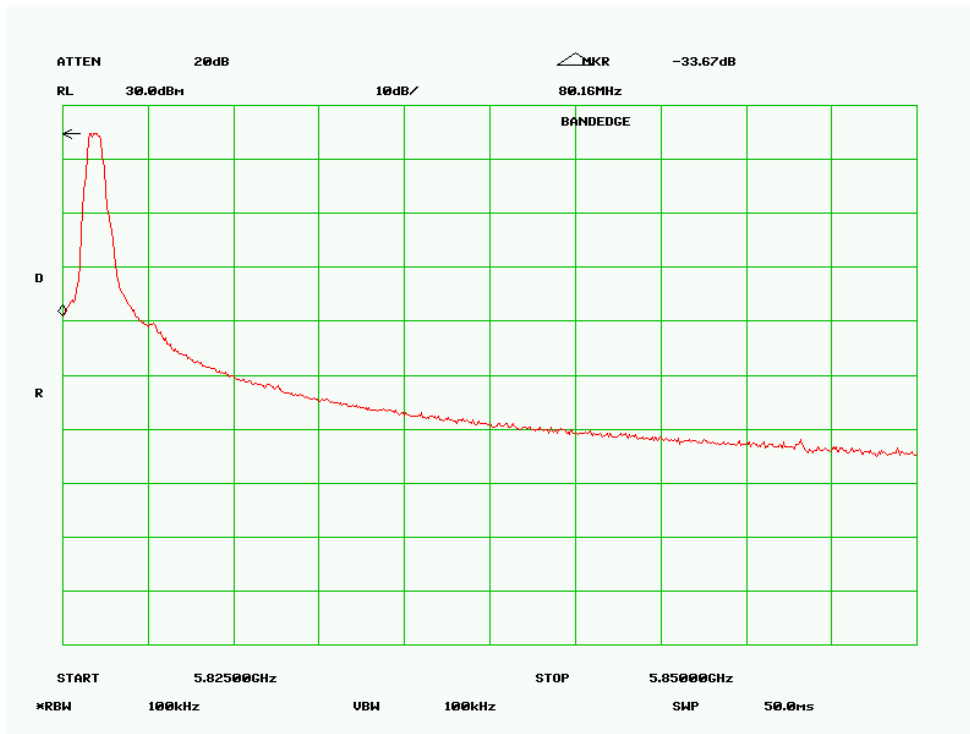
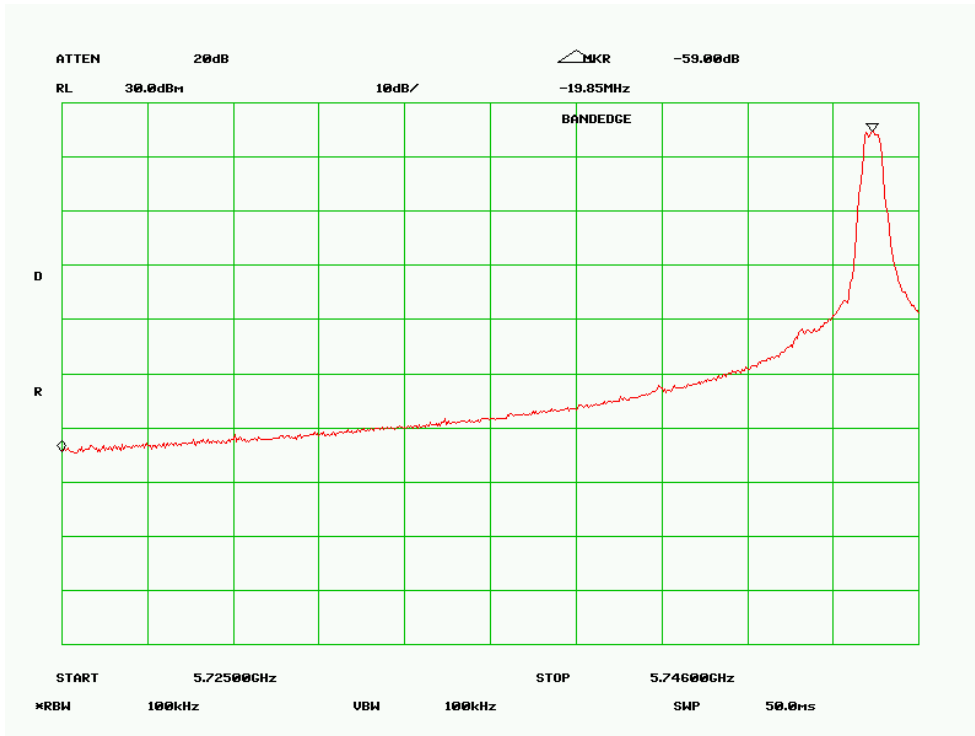
Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.

Base



Handset:



§ 2.1051 - 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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	19° C
Relative Humidity:	65%
ATM Pressure:	1018 mbar

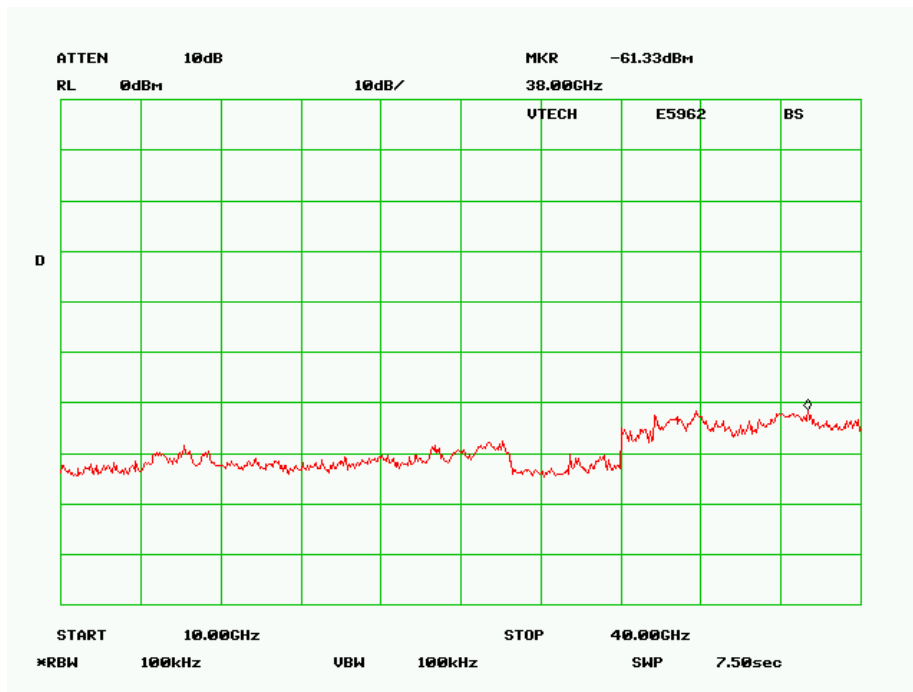
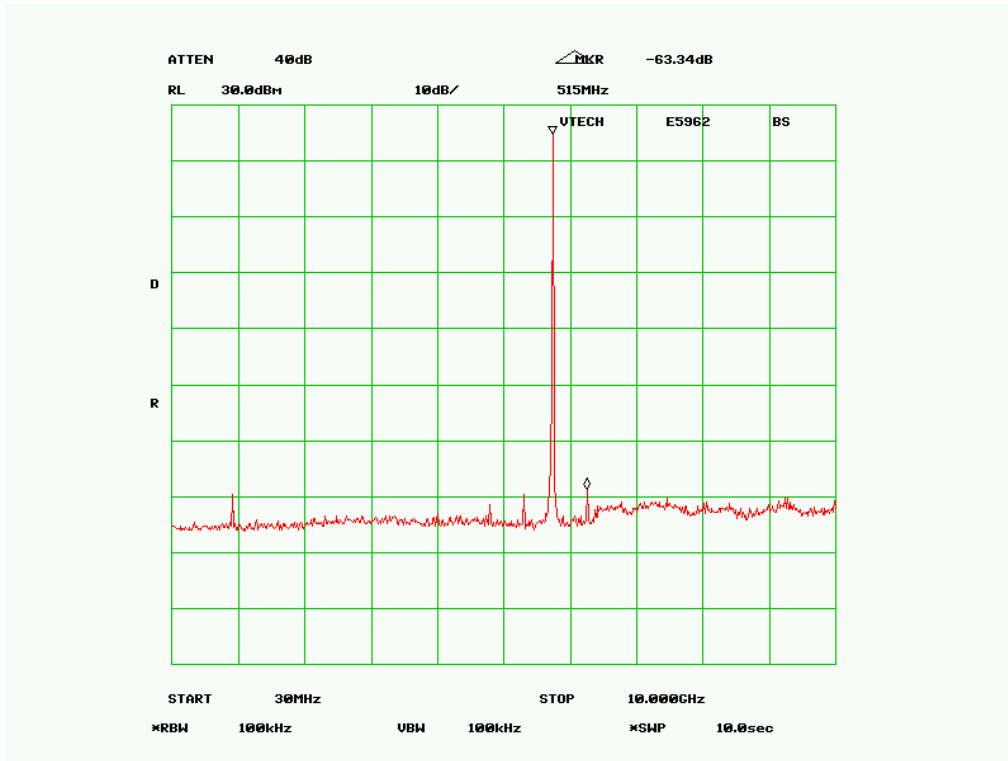
**The testing was performed by Snell Leong on 2005-04-14.*

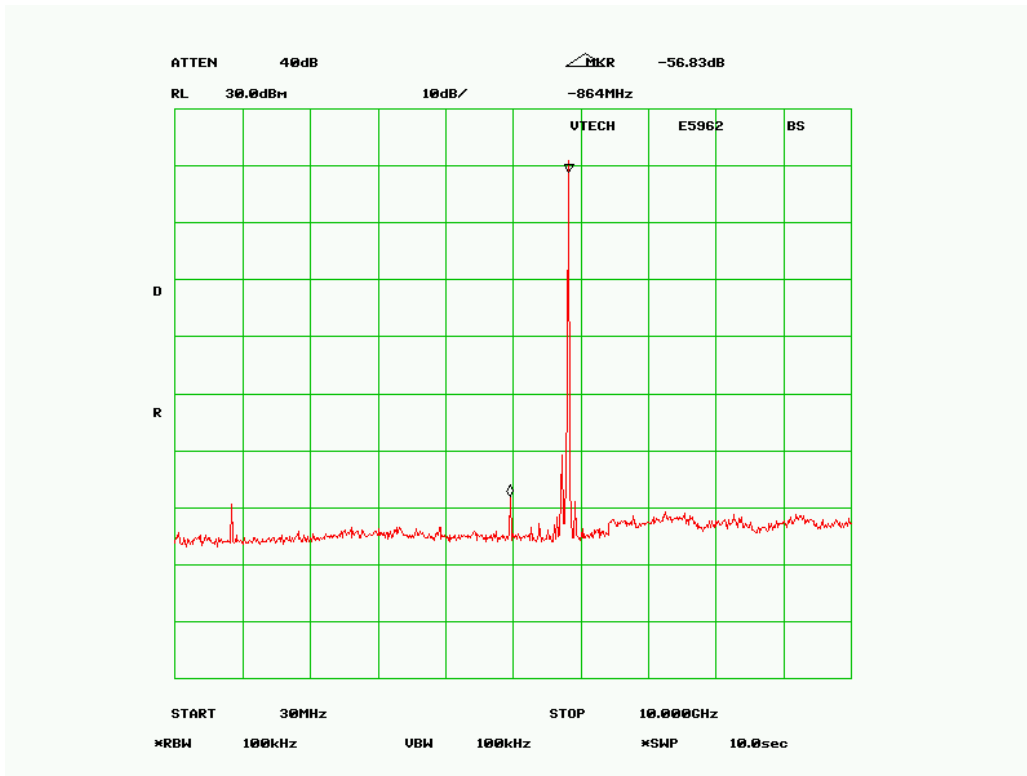
Measurement Results

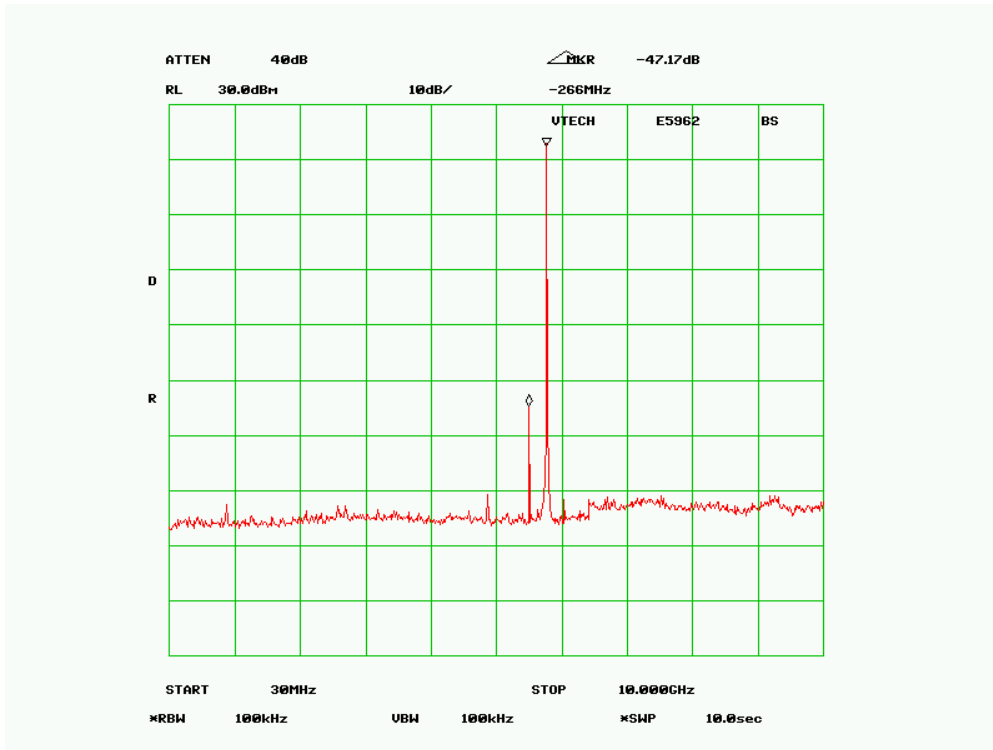
Please refer to the following plots.

Note: Test was conducted in non-hopping continuous transmitting mode.

Base:







Handset:

