NVLAP
Lab Code: 200167-0

BACL
Bay Area Compliance Lab Corp.

FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

Otek Corporation

4016 E. Tennessee Street
Tucson, AZ 85714

FCC ID: OYDMBTR9
Model: MBTR9

This Report Concerns:	**Equipment Type:**
☒ Original Report	900 MHz Transceiver Module

Test Engineer:	Dan Coronia
Report No.:	R0608115-15.247
Report Date:	2006-10-20
Reviewed By:	Engineering Manager: Samuil Lisinker
Prepared By: (12)	Bay Area Compliance Laboratory Corporation 1274 Anvilwood Ave. Sunnyvale, CA 94089 Tel: (408) 732-9162 Fax: (408) 732-9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Otek Corporation*, FCC ID: *OYDMBTR9* or the "EUT" as referred to in this report is a 900 MHz Transceiver Module, which measures approximately 190mmL x 130mm W x 42.5mm H. The EUT is a frequency-hopping device, which operates at the frequency range of 902.2– 927.8MHz, with the maximum conducted output power of -2.31dBm (0.59mW).

** The test data gathered are from a production sample, S/N: PCB-GW-032, provided by the manufacturer.*

EUT Photo

EUT Photo

Antenna View

Objective

This type approval report is prepared on behalf of *Otek Corporation* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, and C.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

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

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 values range from $\pm$2.0 for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

Test Facility

The semi-anechoic chambers used by BACL to collect radiated and conducted emissions measurement data is located in the building at it's facility in Sunnyvale, California, USA.

BACL's test sites have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have 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 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 registration number: 90464 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.

Equipment Modifications

No modifications were made to the EUT.

Power Supply

Manufacturer	Description	Model	Serial Number
HP	Triple Output Power Supply	6236B	2003A05705

SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirements	Compliant
§ 15.205	Restricted Bands	Compliant
§15.207 (a)	Conducted Emissions	N/A
§15.209	Radiated Emissions	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1) (i)	Channel Bandwidth	Compliant
§15.247 (a) (1) (ii)	Dwell Time	Compliant
§15.247 (b) (2)	Maximum Peak Output Power	Compliant
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§ 15.247 (e)(i) & §2.1091	RF Exposure	Compliant
§ 2.1051	Spurious Emissions at Antenna Port	Compliant

§15.203 - ANTENNA REQUIREMENT

Applicable Standard

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.

Refer to statement below for compliance.

"The antenna for this device is an integral antenna that the end user cannot access. Furthermore the device is for indoor/outdoor use as detailed in the Users Manual and Operational Description".

Antenna Connected Construction

The antenna employs a reverse polarity connector to ensure that the end user will not be able to use it with aftermarket or other non *Otek Corporation* antennae.

☒ **Compliant** ☐ **N/A**

§15.207 – CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

This test is Not Applicable (N/A) to the EUT. The EUT is designed to be connected to direct current power source (battery) and is not designed to be connected to the public utility (AC) power line.

☐ **Compliant** ☒ **N/A**

§15.205 & §15.209 - RADIATED EMISSIONS

Applicable Standard: FCC §15.205 Restricted bands of operation

(a) Except as shown in 15.205 paragraphs (d), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	MHz	GHz	GHz
0.090 – 0.110	8.291 – 8.294	16.69475 – 16.69525	156.7 – 156.9	1435 – 1626.5	3.332 – 3.339	10.6 – 12.7
0.495 – 0.505	8.362 – 8.366	25.5 – 25.67	162.0125 –167.17	1645.5 – 1646.5	3.3458 – 3.358	13.25 – 13.4
2.1735 – 2.1905	8.37625 – 8.38675	37.5 – 38.25	167.72 – 173.2	1660 – 1710	3.600 – 4.400	14.47 – 14.5
4.125 – 4.128	8.41425 – 8.41475	73 – 74.6	240 – 285	1718.8 – 1722.2	4.5 – 5.15	15.35 – 16.2
4.17725 – 4.17775	12.29 – 12.293	74.8 – 75.2	322 – 335.4	2200 – 2300	5.35 – 5.46	17.7 – 21.4
4.20725 – 4.20775	12.51975 – 12.52025	108 – 121.94	399.9 – 410	2310 – 2390	7.25 – 7.75	22.01 – 23.12
6.215 – 6.218	12.57675 – 12.57725	123 – 138	608 – 614	2483.5 – 2500	8.025 – 8.5	23.6 – 24.0
6.26775 – 6.26825	13.36 – 13.41	149.9 – 150.05	960 – 1240	2690 – 2900	9.0 – 9.2	31.2 – 31.8
6.31175 – 6.31225	16.42 – 16.423	156.52475 – 156.52525	1300 – 1427	3260 – 3267	9.3 – 9.5	36.43 – 36.5
						Above 38.6

(b) Except as provided in 15.205 paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e), regardless of the field strength limits specified elsewhere in this Subpart, the provisions of this Section apply to emissions from any intentional radiator.

☒ **Compliant** ☐ **N/A**

Applicable Standard: FCC §15.209 Radiated emission limits, general requirements.

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

(b) In the emission table above, the tighter limit applies at the band edges.

☒ **Compliant** ☐ **N/A**

Test Setup

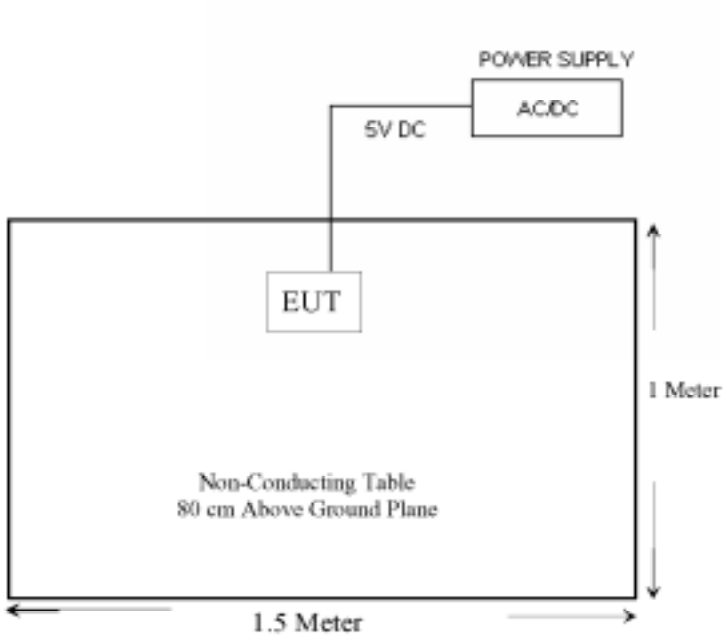
The radiated emissions tests were performed in the 3-meter open area test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Sonoma	Amplifier, Pre	317	260408	2006-02-03
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	2005-08-10
Sunol Sciences	Antenna	JB3	A020106-3/S006628	2006-03-14
A. R.A	Horn Antenna	DRG-118/A	1132	2005-08-17

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

Test Setup Diagram



Environmental Conditions

Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

**The testing was performed by Dan Coronia on 2006-10-19.*

Test Procedure

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

All data were 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:

Cord. Amp. = 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 = Cord. Amp. - Class B Limit

Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, and had the worst margin of:

-7.05 dB at **902.00 MHz** in the **Vertical** polarization at **Low** Channel

-10.7 dB at **915.00 MHz** in the **Vertical** polarization at **Middle** Channel

-6.90 dB at **928.00 MHz** in the **Vertical** polarization at **High** Channel

Radiated Emissions Test Result Data:

Run # 1: Low CH = 902.2 MHz

Frequency	Reading	Azimuth	Height	Polarization	Antenna Factor	Cable Loss	Amplifier Gain	Corrected Reading	Limit	Margin	Comments
MHz	dBuV	Degrees	Meters	H / V	dB/m	dB	dB	dBuV/m	dBuV/m	(dB)	
902.0	61.3	140	1.8	V	22.60	2.45	27.4	58.95	66	-7.05	Band Edge/Peak
902.0	60.1	84	1.8	H	22.60	2.45	27.4	57.75	66	-8.25	Band Edge/Peak
902.2	106.1	140	1.8	V	22.60	2.45	27.4	103.75	114	-10.25	Fund/Peak
902.0	33.1	140	1.8	V	22.60	2.45	27.4	30.75	46	-15.25	Band Edge/Ave
902.2	100.4	84	1.8	H	22.60	2.45	27.4	98.05	114	-15.95	Fund/Peak
902.0	31.9	84	2.0	H	22.60	2.45	27.4	29.55	46	-16.45	Band Edge/Ave
902.2	77.9	140	1.8	V	22.60	2.45	27.4	75.55	94	-18.45	Fund/Ave
902.2	72.2	84	1.8	H	22.60	2.45	27.4	69.85	94	-24.15	Fund/Ave
1806.0	54.8	60	1.0	V	26.10	1.67	35.4	47.17	74	-26.83	Peak
1806.0	51.1	60	2.0	H	26.10	1.67	35.4	43.47	74	-30.53	Peak
1806.0	26.6	60	1.5	V	26.10	1.67	35.4	18.97	54	-35.03	Ave
1806.0	22.9	60	1.5	H	26.10	1.67	35.4	15.27	54	-38.73	Ave

Note: PW = 1.5 ms, PP = 1s (Duty cycle = 0.15 %)

Run # 2: Mid CH = 915 MHz

Frequency	Reading	Azimuth	Height	Polarization	Antenna Factor	Cable Loss	Amplifier Gain	Corrected Reading	Limit	Margin	Comments
MHz	dBuV	Degrees	Meters	H / V	dB/m	dB	dB	dBuV/m	dBuV/m	(dB)	
915.0	106.4	140	1.8	V	22.40	1.80	27.3	103.30	114	-10.70	Fund/Peak
915.0	99.7	84	1.8	H	22.40	1.80	27.3	96.60	114	-17.40	Fund/Peak
915.0	78.2	140	1.8	V	22.40	1.80	27.3	75.10	94	-18.90	Fund/Ave
915.0	71.5	84	1.8	H	22.40	1.80	27.3	68.40	94	-25.60	Fund/Ave
1830.0	55.5	60	1.0	V	26.10	1.67	35.4	47.87	74	-26.13	Peak
1830.0	50.2	60	2.0	H	26.10	1.67	35.4	42.57	74	-31.43	Peak
1830.0	27.3	60	1.5	V	26.10	1.67	35.4	19.67	54	-34.33	Ave
1830.0	22.0	60	1.5	H	26.10	1.67	35.4	14.37	54	-39.63	Ave

Run # 3: High CH = 927.8 MHz

Frequency	Reading	Azimuth	Height	Polarization	Antenna Factor	Cable Loss	Amplifier Gain	Corrected Reading	Limit	Margin	Comments
MHz	dBuV	Degrees	Meters	H / V	dB/m	dB	dB	dBuV/m	dBuV/m	(dB)	
928.0	62.5	140	1.8	V	22.10	1.80	27.3	59.10	66	-6.90	Band Edge/Peak
928.0	60.4	84	1.8	H	22.10	1.80	27.3	57.00	66	-9.00	Band Edge/Peak
927.8	105.9	140	1.8	V	22.10	1.80	27.3	102.50	114	-11.50	Fund/Peak
928.0	34.3	140	1.8	V	22.10	1.80	27.3	30.90	46	-15.10	Band Edge/Ave
927.8	102.1	84	1.8	H	22.10	1.80	27.3	98.70	114	-15.30	Fund/Peak
928.0	32.2	84	2.0	H	22.10	1.80	27.3	28.80	46	-17.20	Band Edge/Ave
927.8	77.7	140	1.8	V	22.10	1.80	27.3	74.30	94	-19.70	Fund/Ave
927.8	73.9	84	1.8	H	22.10	1.80	27.3	70.50	94	-23.50	Fund/Ave
1854.0	54.9	60	1.0	V	26.10	1.67	35.4	47.27	74	-26.73	Peak
1854.0	51.0	60	2.0	H	26.10	1.67	35.4	43.37	74	-30.63	Peak
1854.0	26.7	60	1.5	V	26.10	1.67	35.4	19.07	54	-34.93	Ave
1854.0	22.8	60	1.5	H	26.10	1.67	35.4	15.17	54	-38.83	Ave

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

Applicable Standard

According to §15.247(a)(1): Frequency hopping systems 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. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

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
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

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

Test Setup Diagram

Environmental Conditions

Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

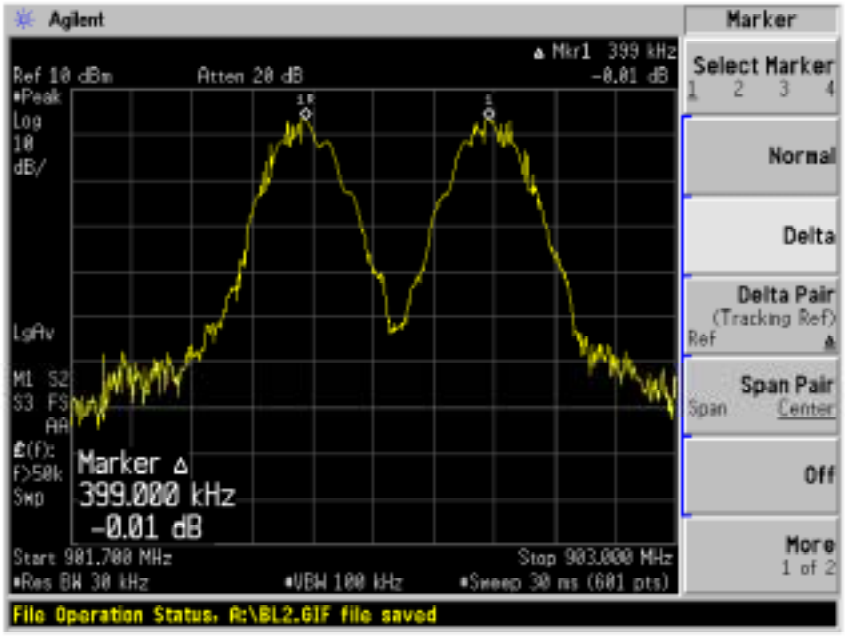
**The testing was performed by Dan Coronia on 2006-10-19.*

Measurement Results

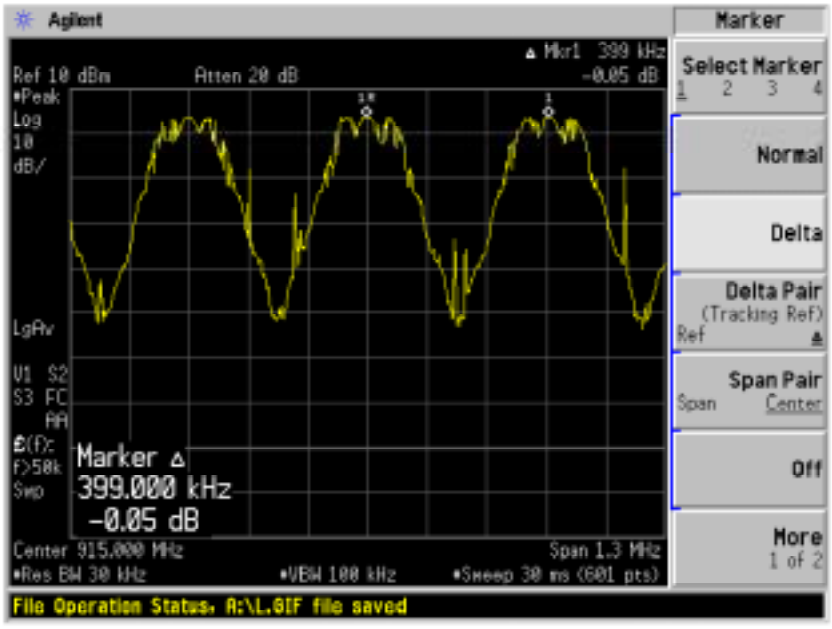
Channel	Frequency (MHz)	Channel Separation (KHz)
Low	902.2	399
Mid	915	399
High	927.8	399

Please refer to the following plots.

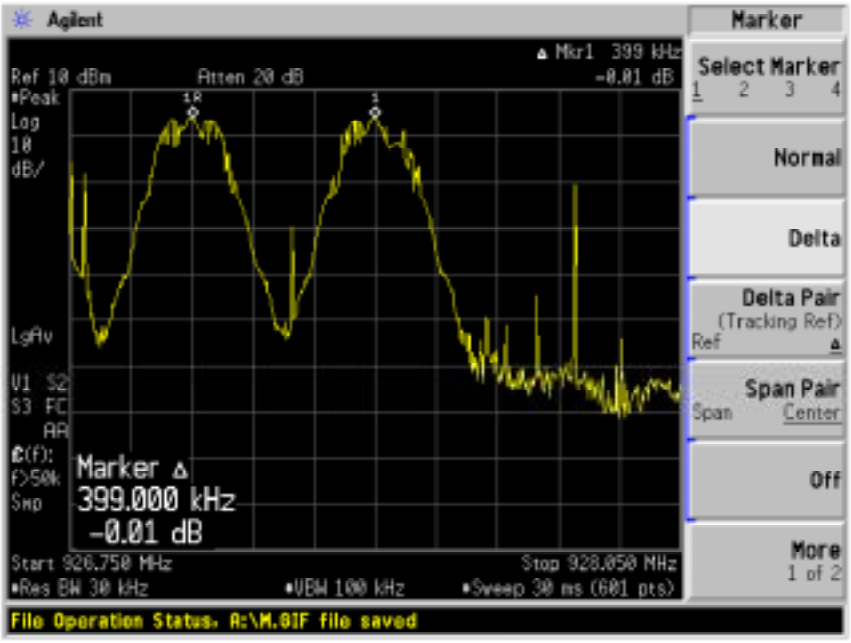
Low Channel



Middle Channel



High Channel



§15.247 (a)(1)(i) – HOPPING CHANNEL BANDWIDTH

Applicable Standard

According to §15.247 (a)(1)(i): For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

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 emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

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

Test Setup Diagram

Environmental Conditions

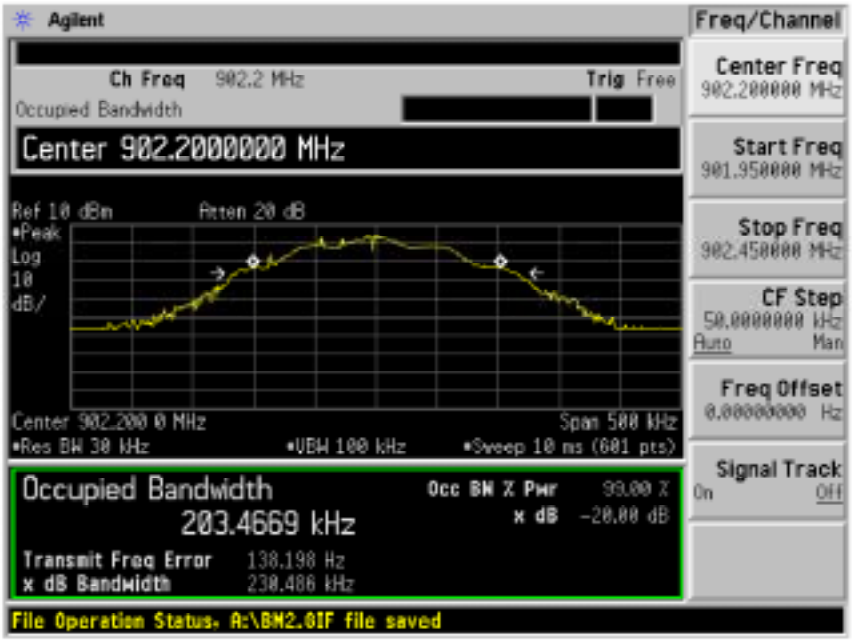
Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

**The testing was performed by Dan Coronia on 2006-10-19.*

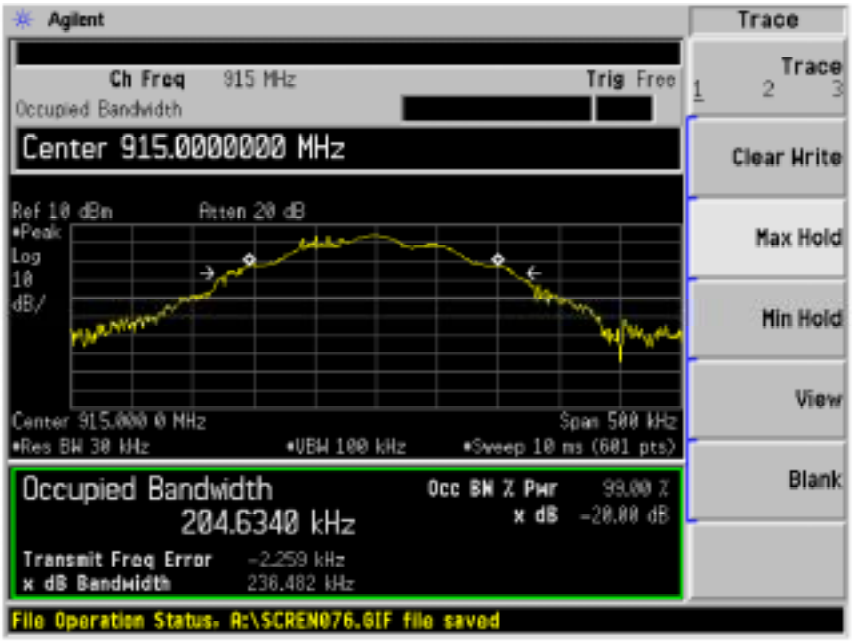
Measurement Result

Please see the following plots

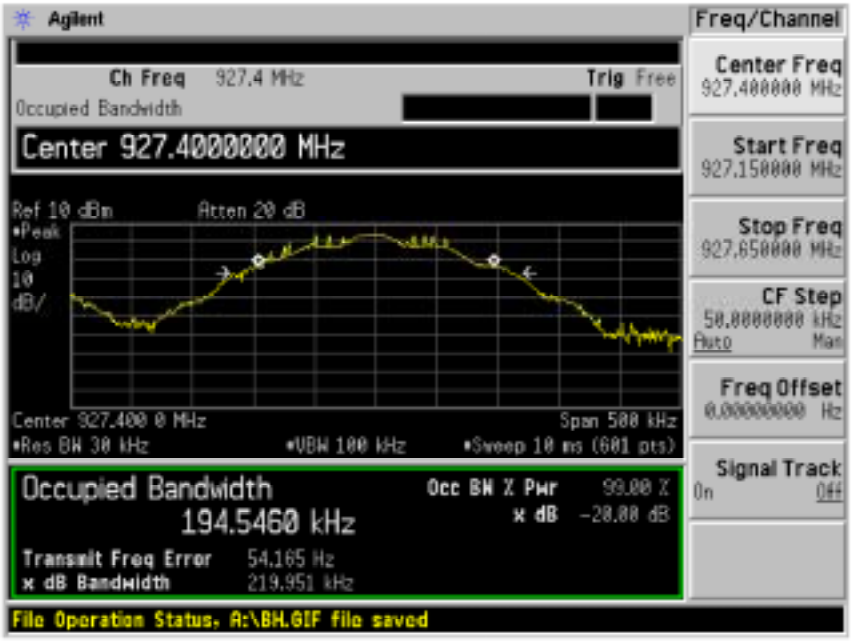
Low Channel



Middle Channel



High Channel



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

Applicable Standard

According to §15.247(a)(1)(iii), For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

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
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

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

Test Setup Diagram

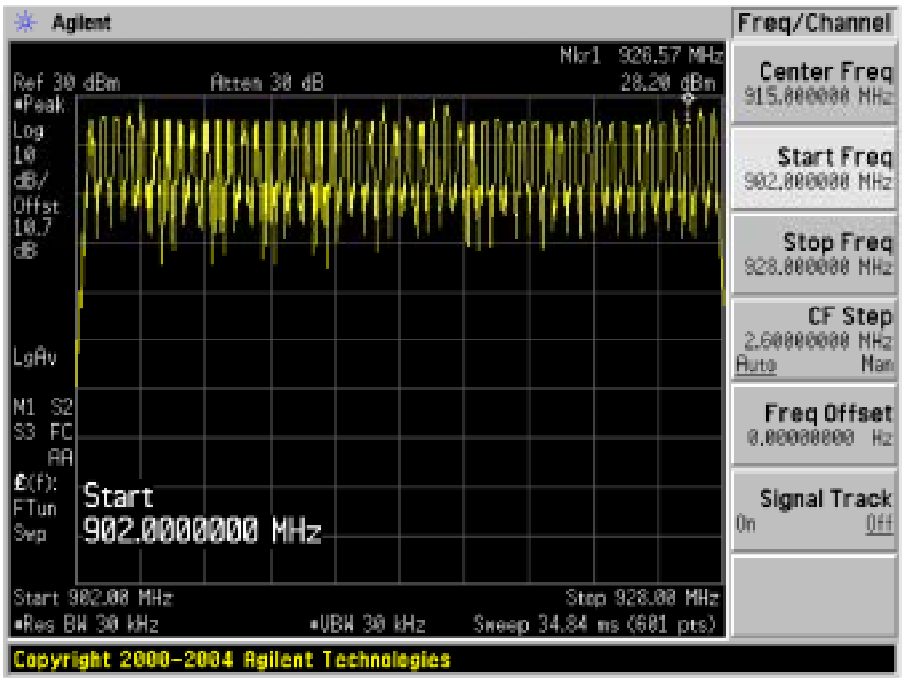
Environmental Conditions

Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

**The testing was performed by Dan Coronia on 2006-10-19.*

Measurement Results: 50

Please refer to the plot below.



§15.247(a)(1)(i) - DWELL TIME

Applicable Standard

According to §15.247 (a)(1)(i), For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

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
Rohde & Schwarz	Spectrum analyzer	FSEM	DE23840	2005-12-21

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

Test Setup Diagram

Environmental Conditions

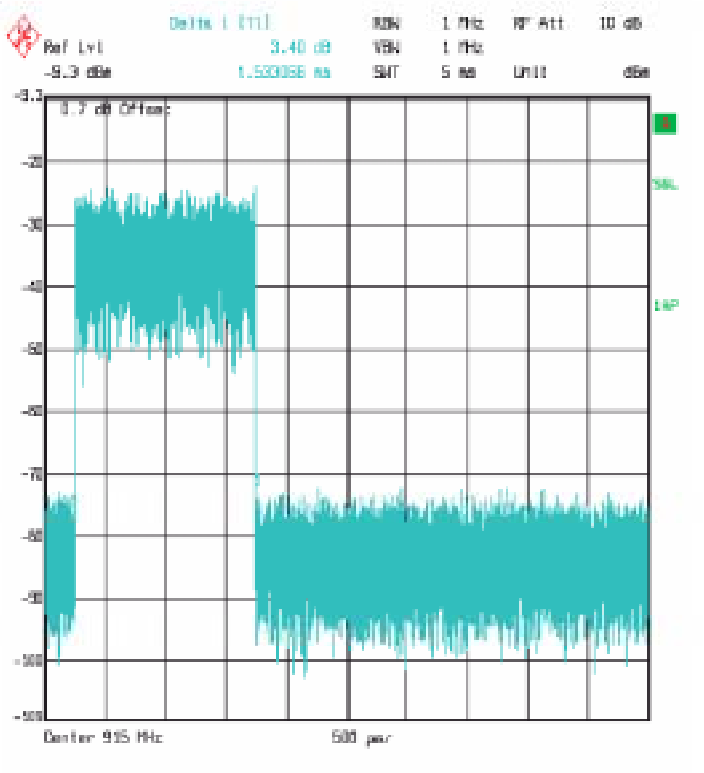
Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

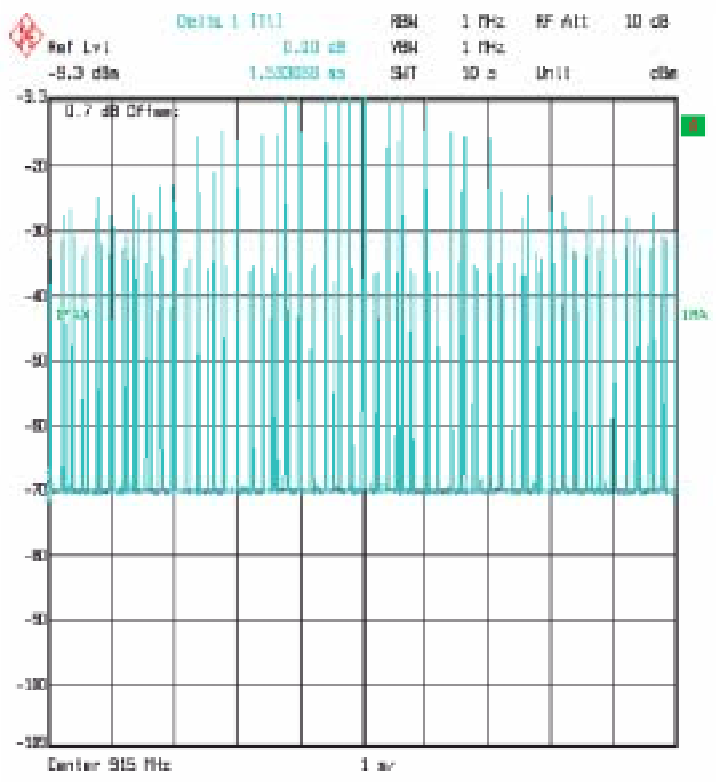
**The testing was performed by Dan Coronia on 2006-10-19.*

Measurement Results:

Channel	Frequency MHz	Pulse Width ms	Dwell Time Sec.	Limit Sec.	Result
Mid	915	1.533	0.029	0.4	Pass

Please refer the following plots.




Delta 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
0.10 dB
VBW 1 MHz
-5.3 dBm
SWT 10 s
Unit dBm
0.7 dB Offset
Center 915 MHz
1 av

§15.247(b) (2) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

According to §15.247(b) (2), For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

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
Rohde & Schwarz	Spectrum analyzer	FSEM	DE23840	2005-12-21

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

Test Setup Diagram

Environmental Conditions

Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

**The testing was performed by Dan Coronia on 2006-10-19.*

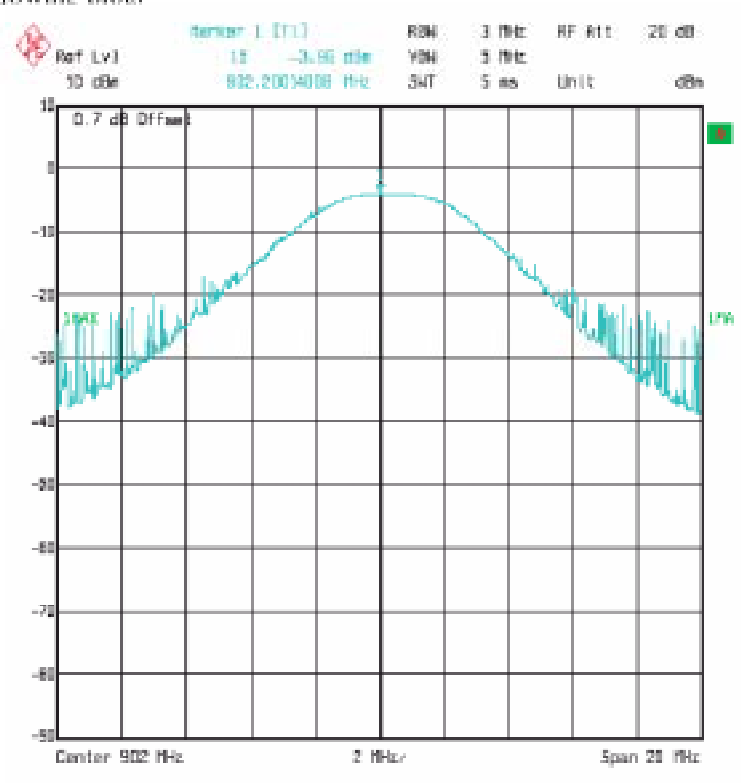
Measurement Result

Channel	Frequency (MHz)	Max Peak Output Power		Limit (mw)	Result
		(dBm)	(mw)		
Low	902.200	-3.96	0.40	1000	Pass
Mid	915.250	-2.77	0.53	1000	Pass
High	927.800	-2.31	0.59	1000	Pass

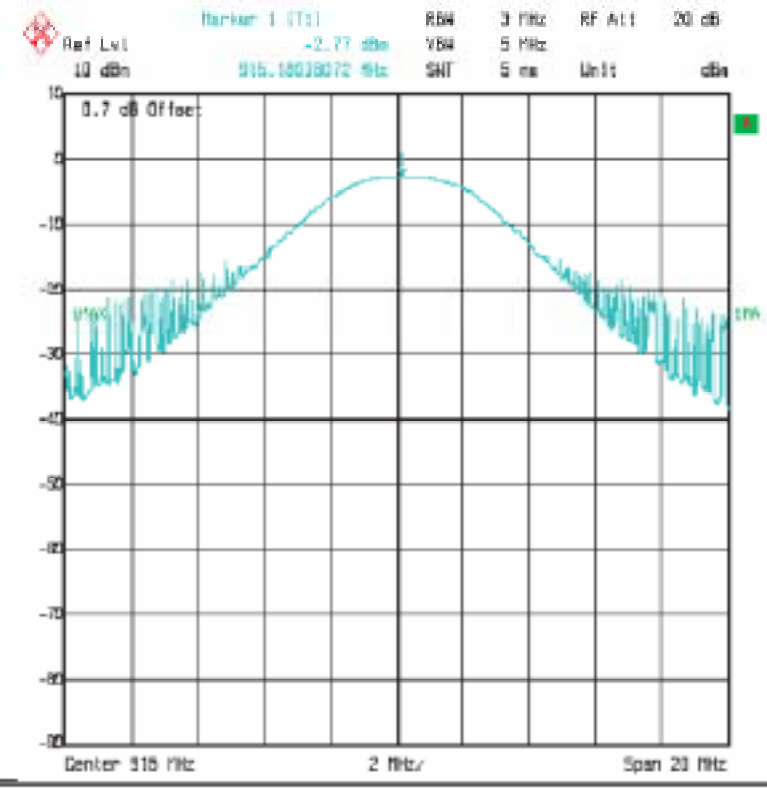
Plots of Maximum Peak Output Power

Please see the following plots

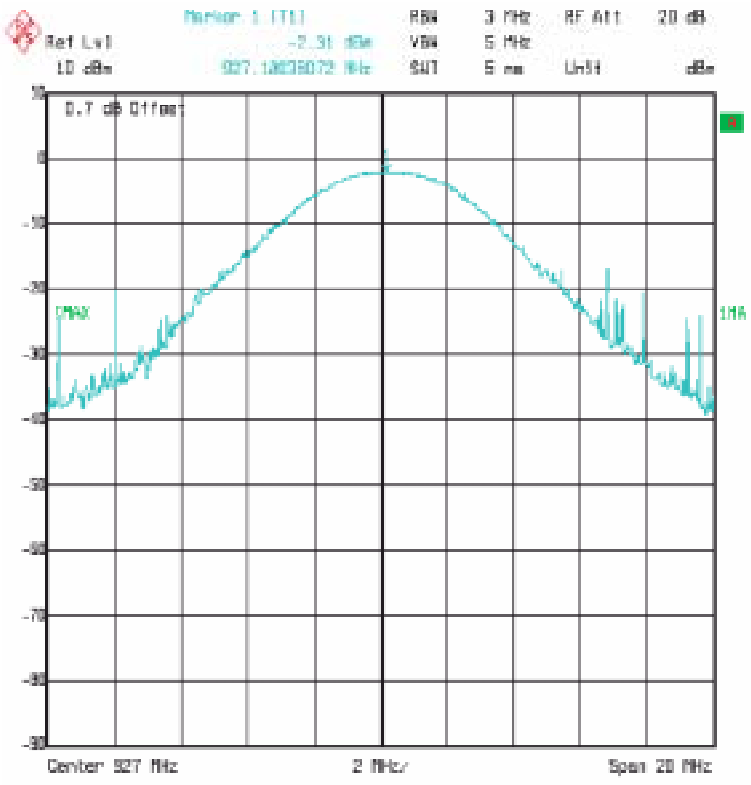
Low Channel



Middle Channel



High Channel



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

Applicable Standard

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

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 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
Rohde & Schwarz	Spectrum analyzer	FSEM	DE23840	2005-12-21

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

Test Setup Diagram

Environmental Conditions

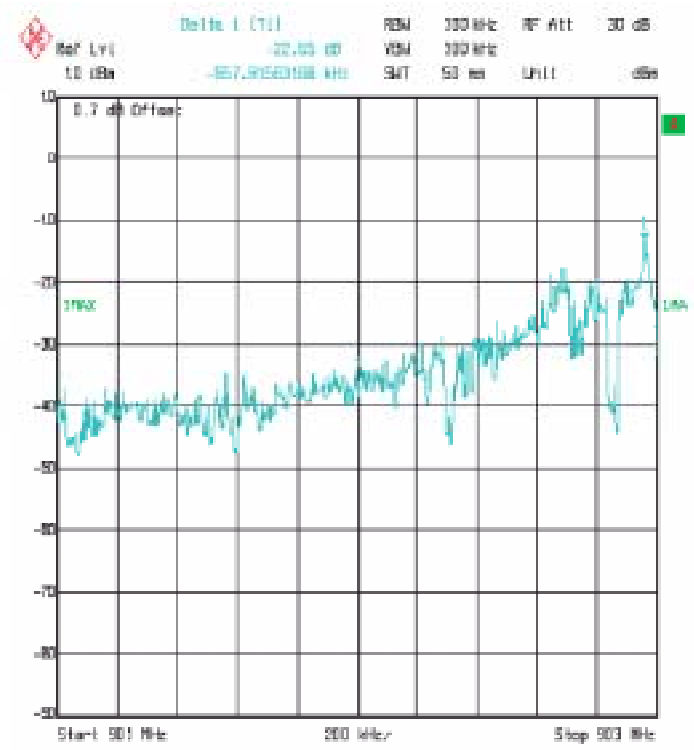
Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

**The testing was performed by Dan Coronia on 2006-10-19.*

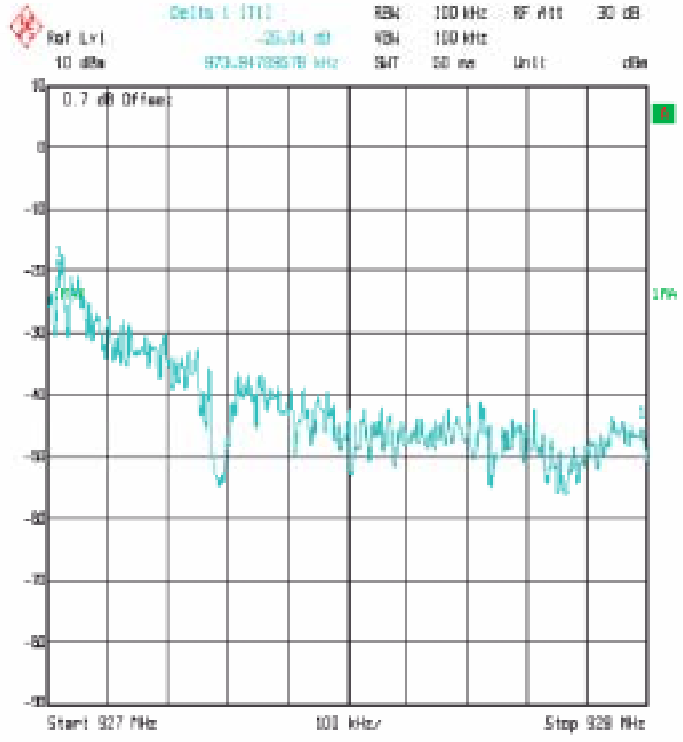
Plots of 100kHz Bandwidth of Band Edge

Hopping Mode:

Low Channel



High Channel



§ 15.247 (e) (i) and § 2.1091 - 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 §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
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
1500-100,000	/	/	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

Maximum peak output power at antenna input terminal: -2.31(dBm)
Maximum peak output power at antenna input terminal: 0.59 (mw)
Prediction distance: 20 (cm)
Predication frequency: 915 (MHz)
Antenna Gain (typical): 2.5 (dBi)
Antenna gain: 1.78 (numeric)
Power density at predication frequency at 20 cm: 0.0002(mW/cm^2)

MPE limit for uncontrolled exposure at prediction frequency: 0.61 (mW/cm^2)

Test Result

The EUT is a mobile device. The power density level at 20 cm is 0.0002mW/cm^2, which is below the uncontrolled exposure limit of 0.61mW/cm^2 at 915 MHz.

§2.1051 SPURIOUS EMISSIONS AT ANTENNA PORT

Applicable Standard

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
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

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

Test Setup Diagram

Environmental Conditions

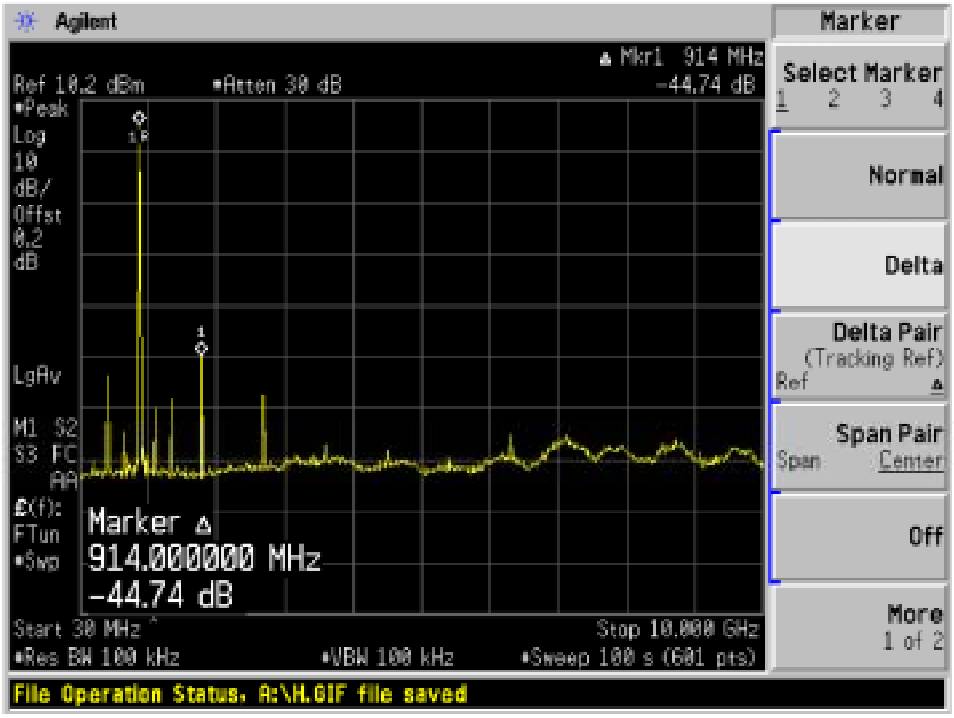
Temperature:	22° C
Relative Humidity:	60%
ATM Pressure:	1022 mbar

**The testing was performed by Dan Coronia on 2006-10-19*

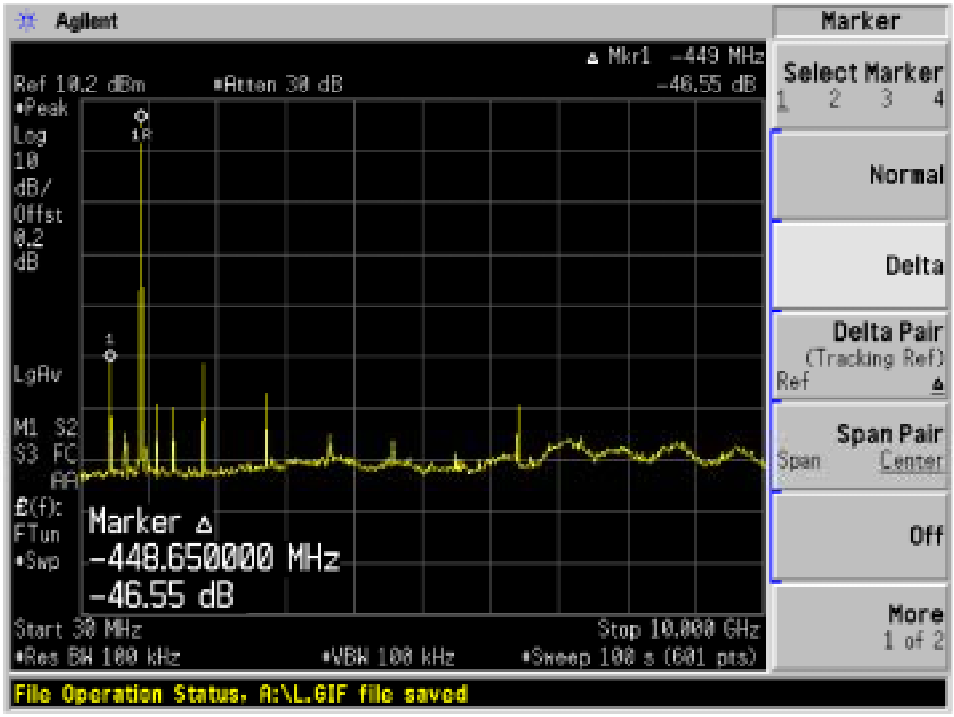
Measurement Results

Please refer to the following plots.

Low Channel



Mid Channel



High Channel