Lab Code: 200167-0

FCC PART 15 SUBPART D

MEASUREMENT AND TEST REPORT

For

Xingtel Xiamen Electronics Co., Ltd.

Xingtel Building, Chungxin Road, Torch Hi-tech Industrial District,
Xiamen 361006, China

FCC ID: QMH-CL3319

Report Type: ☒ Original Report		**Product Type:** 1.9 GHz Cordless Phone-Base
Test Engineer:	James Ma	
Report Number:	R0710019-B	
Report Date:	2007-11-13	
Reviewed By:	Boni Baniqued Sr. RF Engineer	
Prepared By:	Bay Area Compliance Laboratories Corp. **(BACL)** 1274 Anvilwood Ave. Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732-9164	

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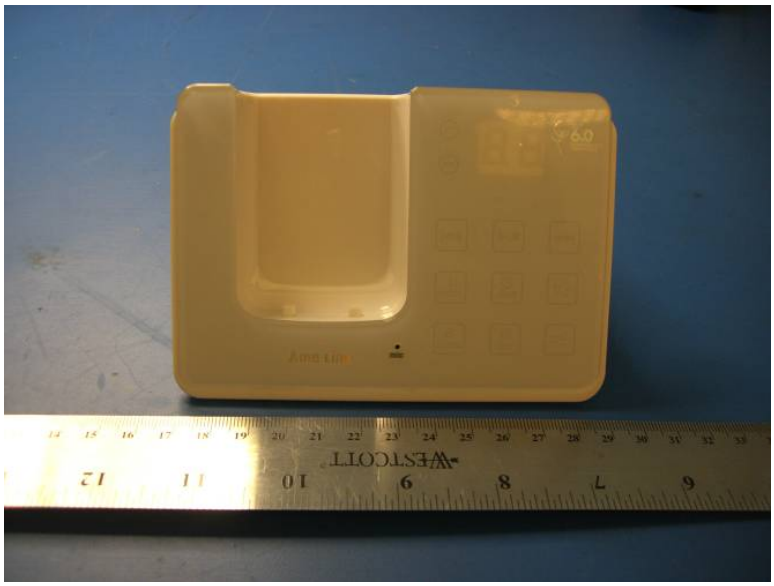
1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Xiamen Xinglian Electronics Co., Ltd.*'s product, *FCC ID: QMH-CL3319, Models: CL-3319, CL-3319Dual, CL-3319HS* or the "EUT" as referred to in this report is a *1.9 GHz DECT Cordless Phone.* This EUT uses an internal antenna.

** The test data gathered are from production sample, serial number: B1334 provided by the manufacturer.*

1.2 EUT Photos



Base
For additional photos please refer to Exhibit C.

1.3 Mechanical Description of EUT

The *Xiamen Xinglian Electronics Co., Ltd product, FCC ID: QMH-CL3319, Models: CL-3319, CL-3319Dual, CL-3319HS* is made of plastic construction.

The EUT measures approximately*:*
Handset: 13.0 cm L x 4.3 cm W x 2.1 cm H, weighing: 100g;
Base: 12.7 cm L x 11.4 cm W x 8.0 cm H, weighing: 150g.
Base: Rated input voltage 9 VDC using AC/DC adapter
Handset: 3.6VDC using Battery

1.4 Objective

This type approval report is prepared on behalf of *Xingtel Xiamen Electronics Co., Ltd* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and D of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for Output Power, Antenna Requirements, -26 dB Bandwidth, and Power spectral density, Frequency Stability, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.5 Related Submittal(s)/Grant(s)

Please refer to BACL's Handset report, report number R0710019-H.

1.6 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.7 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.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.8 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL 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 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, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, 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

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the testing mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

The EUT is programmed with the following data rate settings that were used during testing:

Channel	Low	Middle	High
Frequency (MHz)	1921.536	1924.992	1928.448

The Software to exercise the unit was provided by the client.

2.3 Special Accessories

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

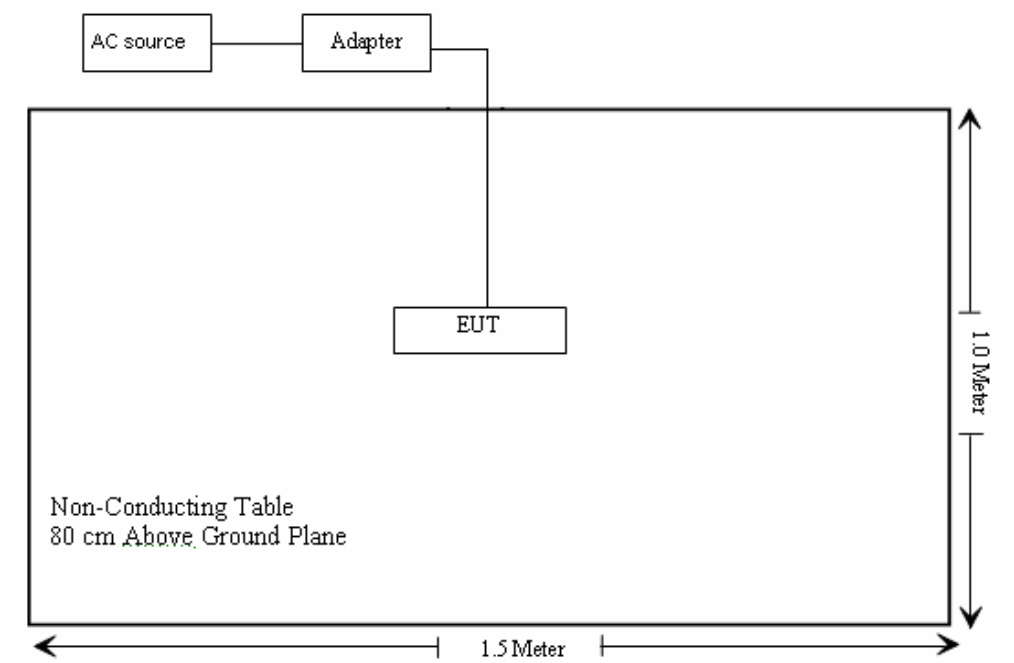
No modifications were made to the EUT.

2.5 Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
Class 2 Power Supply	AC/DC Power Adaptor	U090030D	N/A	None

2.6 Block Diagram of Test Setup

Base:



3 SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC RULES	Description of Test	Result
§15.319(b)	Digital Modulation techniques	Compliant
§15.319(i), §2.1091& §2.1093	RF Exposure	Compliant
§15.317, §15.319(e) & §15.203	Antenna Requirement	Compliant
§15.315 & §15.207	AC Power Line Conducted Emission	Compliant
§15.323(f)	Frequency Stability	Compliant
§15.323(a)	26 dB Emission Bandwidth	Compliant
§15.319(c)	Peak Transmitter Power	Compliant
§15.319(d)	Power Spectral Density	Compliant
§15.323(d), §15.205, §15.209	Transmitter Unwanted Emissions	Compliant
§15.309, §15.109	Receiver Spurious Emissions	Compliant

4 § 15.319 (b) – Digital Modulation Techniques

According to Part 15.319(b), all transmissions must use only digital modulation techniques.

5 § 15.319 (i), § 2.1091 - RF EXPOSURE

According to §15.319(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

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
1500-100,000	/	/	1.0	30

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

5.1 MPE Prediction

Prediction 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

For Base:

Maximum peak output power at antenna input terminal: 19.81 (dBm)
Maximum peak output power at antenna input terminal: 95.72 (mW)
Prediction distance: 20 (cm)
Prediction frequency: 1925 (MHz)
Antenna Gain (typical): 0.5 (dBi)
Antenna gain: 1.12 (numeric)
Power density at prediction frequency at 20 cm: 0.0213(mW/cm^2)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm^2)

5.2 Test Result

The power density level at 20 cm is 0.0213 mW/cm^2, which is below the uncontrolled exposure limit of 1.0mW/cm^2 at 1925 MHz.

6 §15.317, §15.319 (e), §15.203 - ANTENNA REQUIREMENT

6.1 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to § 15.319 (e), if transmitting antennas of directional gain greater than 3 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 3 dBi.

6.2 Result

Compliant.

The antenna for this device is an internal antenna with gain of 0.5 dBi.

7 §15.315 & §15.207 – AC LINECONDUCTED EMISSIONS

7.1 Section 15.207 & RSS-Gen 7.2.2 Conducted limits:

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.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

** Decreases with the logarithm of the frequency.*

7.2 Test Setup

The measurement was performed at shielded room, using the 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 powered via connection to AC/DC adapter which was plugged into the LISN.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Solar Electronics	Artificial-Mains Network	9252-R-24-BNC	511205	2007-07-30
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2007-03-08
Sunol Science Corp	System Controller	SC99V	113005-1	NA

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

7.4 Test Procedure

During the conducted emissions test, the power cord of the system was connected to the main outlet of the LISN-1.

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

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

7.5 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-11-12.*

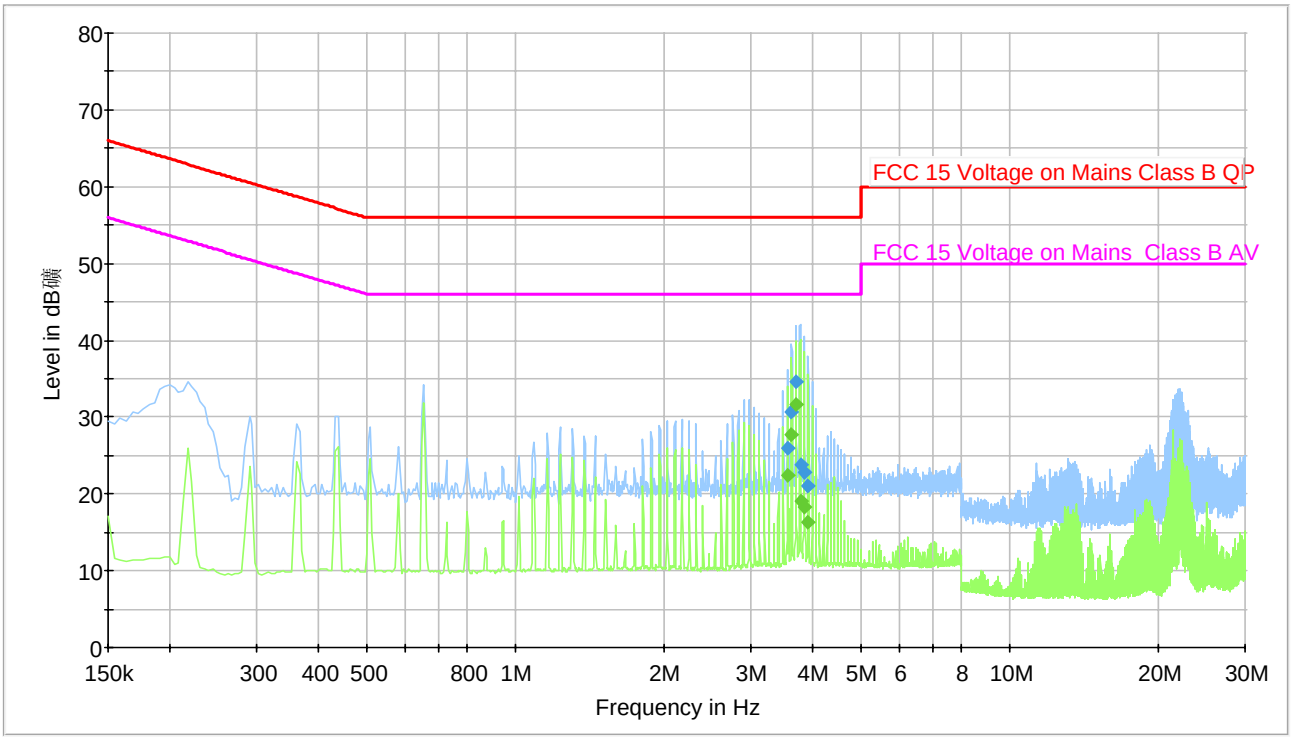
7.6 Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC standard's conducted emissions limits for Class B devices, with the *worst* margin reading of:

-7.50 dB at **3.763500 MHz** in the **Neutral** conductor mode.

7.7 Test Data

120V/60 Hz Hot:



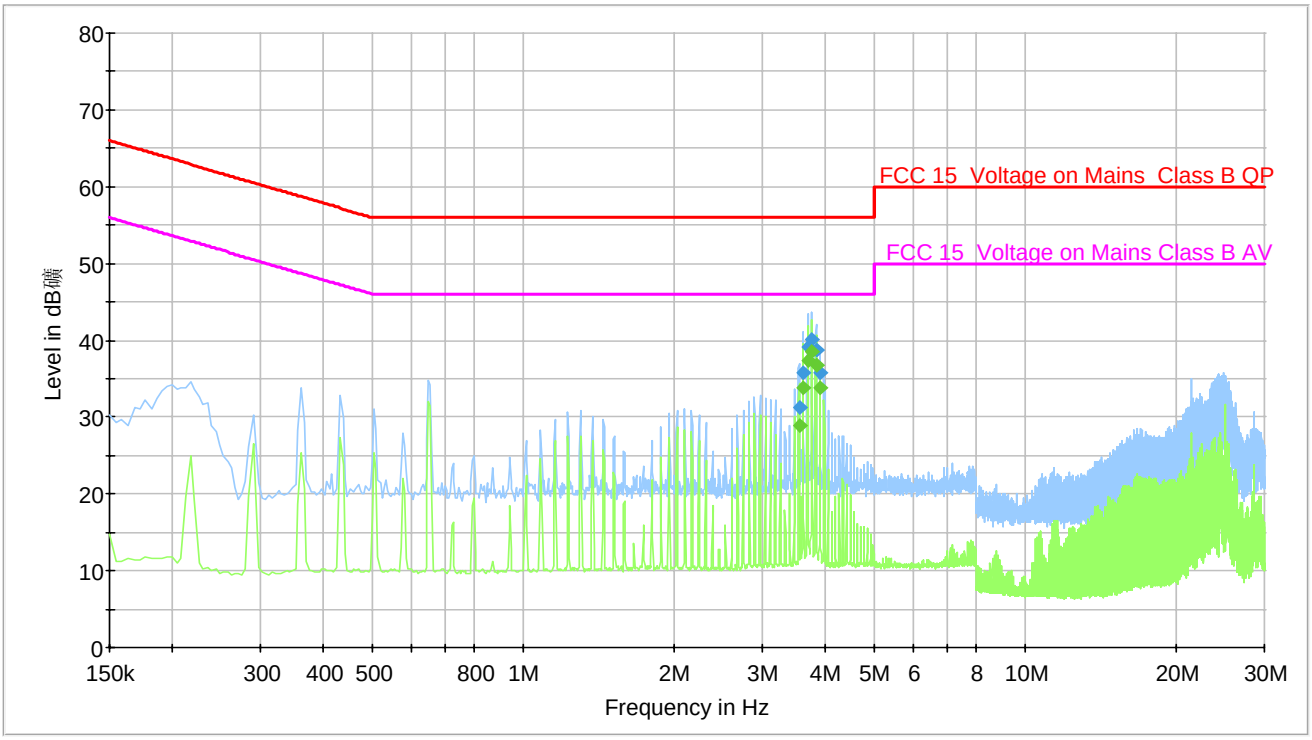
Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
3.700500	34.6	H	56.0	21.4
3.628500	30.7	H	56.0	25.3
3.556500	25.9	H	56.0	30.1
3.777000	23.8	H	56.0	32.2
3.849000	22.8	H	56.0	33.2
3.921000	21.0	H	56.0	35.0

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
3.700500	31.7	H	46.0	14.3
3.628500	27.6	H	46.0	18.4
3.556500	22.3	H	46.0	23.7
3.777000	19.1	H	46.0	26.9
3.849000	18.2	H	46.0	27.8
3.921000	16.3	H	46.0	29.7

120V/60 Hz Neutral:



Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
3.763500	40.1	N	56.0	15.9
3.691500	39.2	N	56.0	16.8
3.835500	38.7	N	56.0	17.3
3.619500	35.7	N	56.0	20.3
3.907500	35.7	N	56.0	20.3
3.547500	31.2	N	56.0	24.8

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
3.763500	38.5	N	46.0	7.5
3.691500	37.4	N	46.0	8.6
3.835500	36.8	N	46.0	9.2
3.619500	33.8	N	46.0	12.2
3.907500	33.8	N	46.0	12.2
3.547500	28.9	N	46.0	17.1

8 §15.323 (f) – FREQUENCY STABILITY

8.1 Applicable Standard

The carrier frequency stability shall be maintained within ±10 ppm (±0.001%).

8.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 110% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

8.3 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-11-12.*

8.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2007-04-26
Tenney	Oven, Temperature	VersaTenn	12.222-193	2007-06-21

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

8.5 Test Data

Temperature (^{O}C)	Voltage (Vac)	Channel Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)
-30	108	1924.992	1924.982	-5.195	±10
	120	1924.992	1924.980	-6.234	±10
	132	1924.992	1924.979	-6.753	±10
20	108	1924.992	1924.994	1.039	±10
	120	1924.992	1924.993	0.519	±10
	132	1924.992	1924.990	-1.039	±10
50	108	1924.992	1924.982	-5.195	±10
	120	1924.992	1924.980	-6.234	±10
	132	1924.992	1924.982	-5.195	±10

9 §15.323 (a) – 26 dB EMISSION BANDWIDTH

9.1 Applicable Standard

According to §15.323(a), the 26 dB Emission Bandwidth shall not be less than 50 kHz nor more than 2.5 MHz.

9.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2007-04-26

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

9.3 Test Procedure

Using the manufacturer's information on occupied bandwidth set the spectrum analyzer as follows:

Resolution bandwidth	1.0% of the emission bandwidth (as close as possible)
Video bandwidth	> 3 times the resolution bandwidth
Number of sweeps	sufficient to stabilize the trace
Detection mode	peak detection with maximum hold

Find the two further frequencies above and below the frequency of the maximum reference spectral level where the spectrum is –26dB. The difference between these two frequencies is the emission bandwidth.

9.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-11-12.*

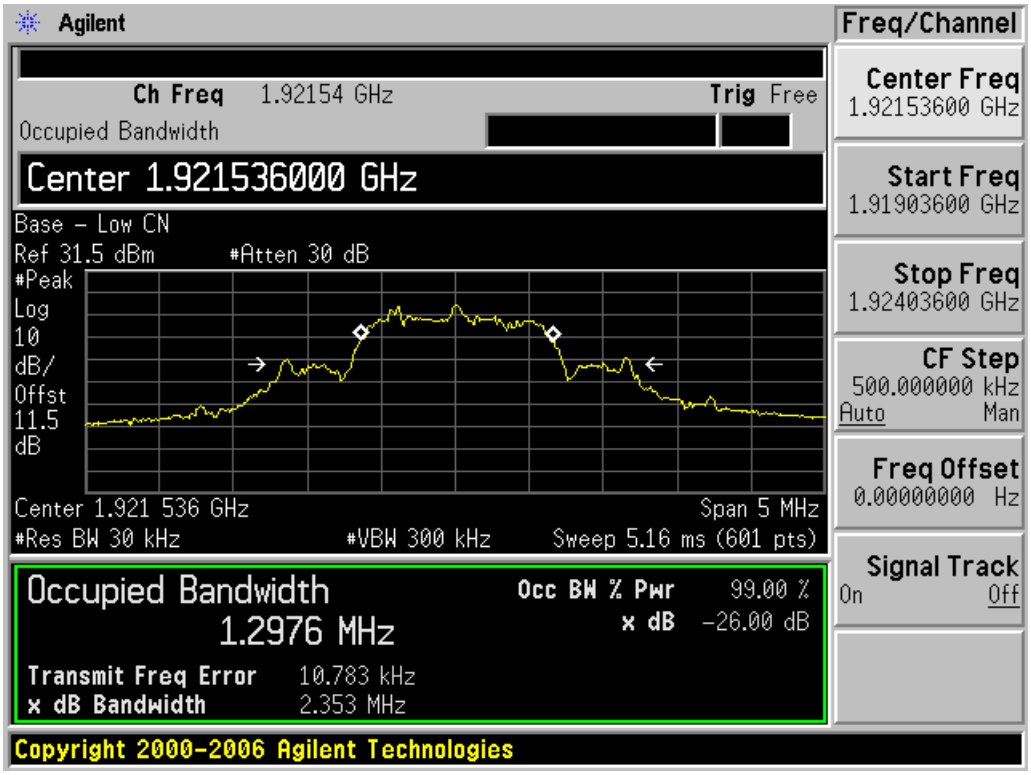
9.5 Test Data

Compliant, please refer to the following tables and plots.

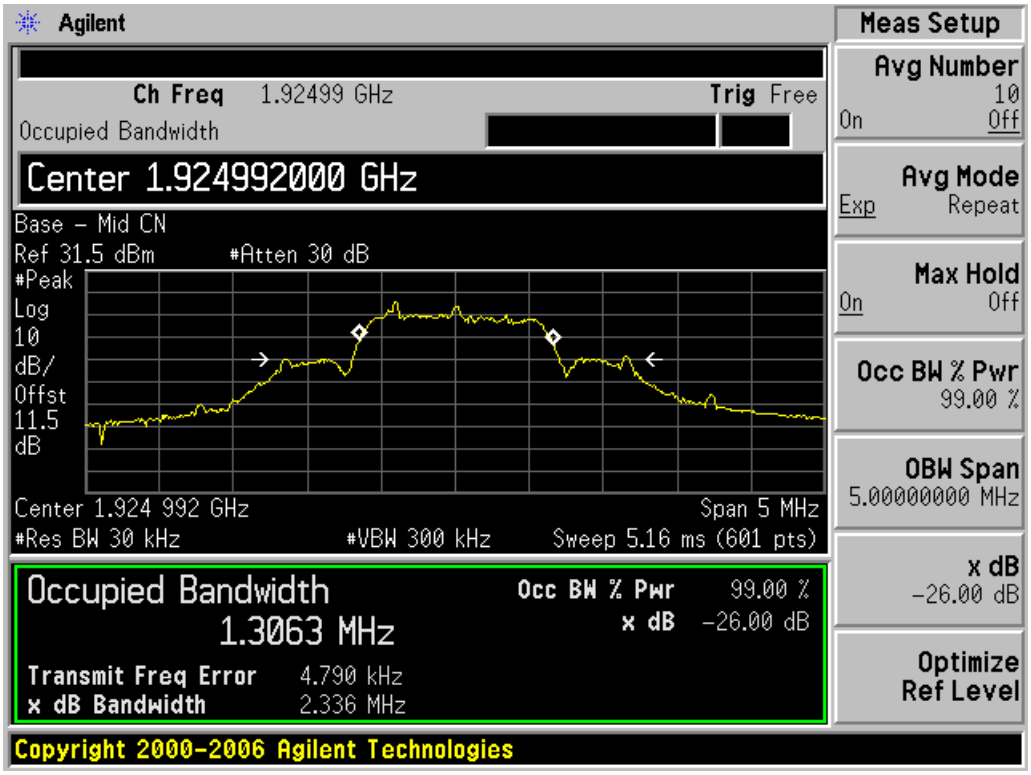
9.5.1 Test Data of Emission Bandwidth:

Channel	Center Frequency (MHz)	-26 dB Bandwidth (MHz)	Limit
Low	1921.536	2.353	50 kHz<BW<2.5 MHz
Middle	1924.992	2.336	50 kHz<BW<2.5 MHz
High	1928.448	2.336	50 kHz<BW<2.5 MHz

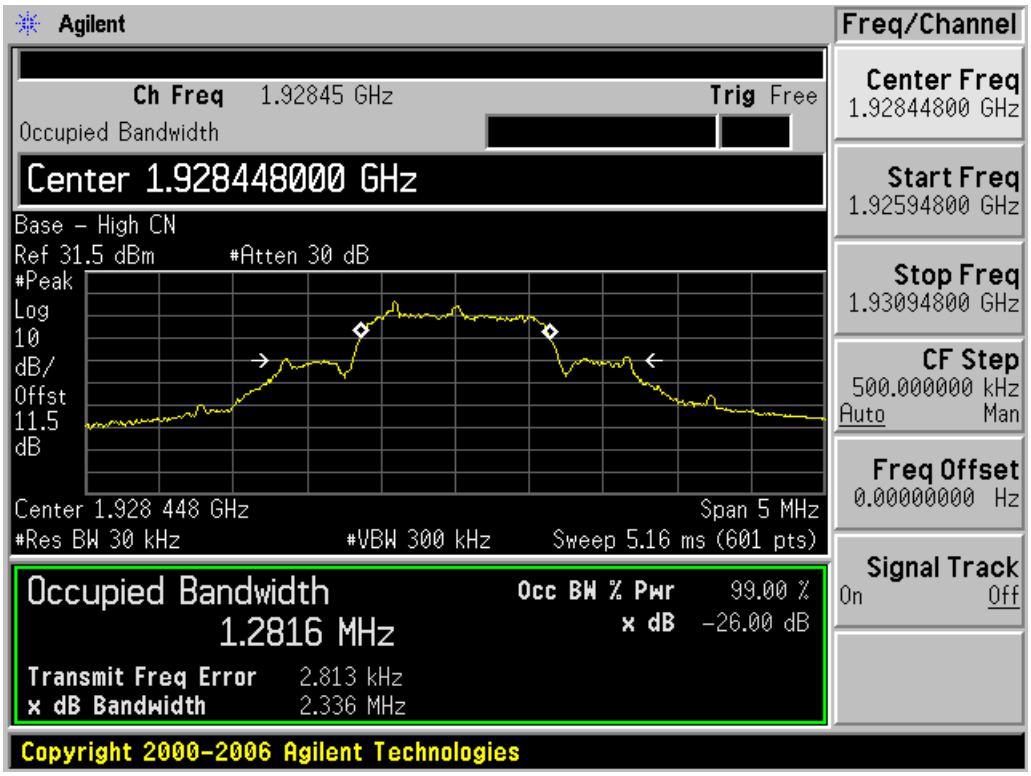
Low Channel



Middle Channel



High Channel



10 §15.319 (c) – PEAK TRANSMITTER POWER

10.1 Standard Applicable

According to §15.319 (c) peak power shall not exceed 100 microwatts multiplied by the square root of the 26 dB Emission bandwidth in hertz.

10.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2007-04-26

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

10.3 Test Procedure

Using the manufacturer's information on emission bandwidth set the spectrum analyzer as follows:

Resolution bandwidth (RBW)	Greater than the occupied bandwidth
Video bandwidth (VBW)	same as the resolution bandwidth
Frequency span	20 MHz
Detection mode	peak detection

In order to ensure that the correct power value is measured, the resolution bandwidth setting shall be increased until negligible changes (no more than 0.5 dB) are observed on the spectrum analyzer display.

10.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-11-12.*

10.5 Test Data

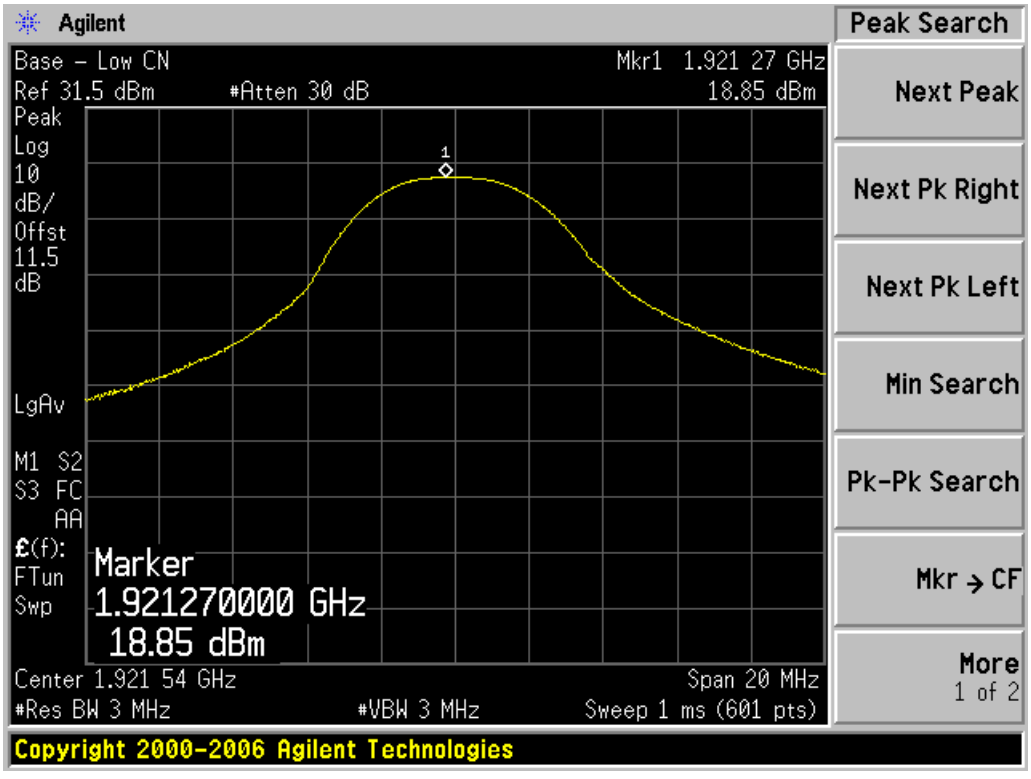
Test Result: Compliant

Base:

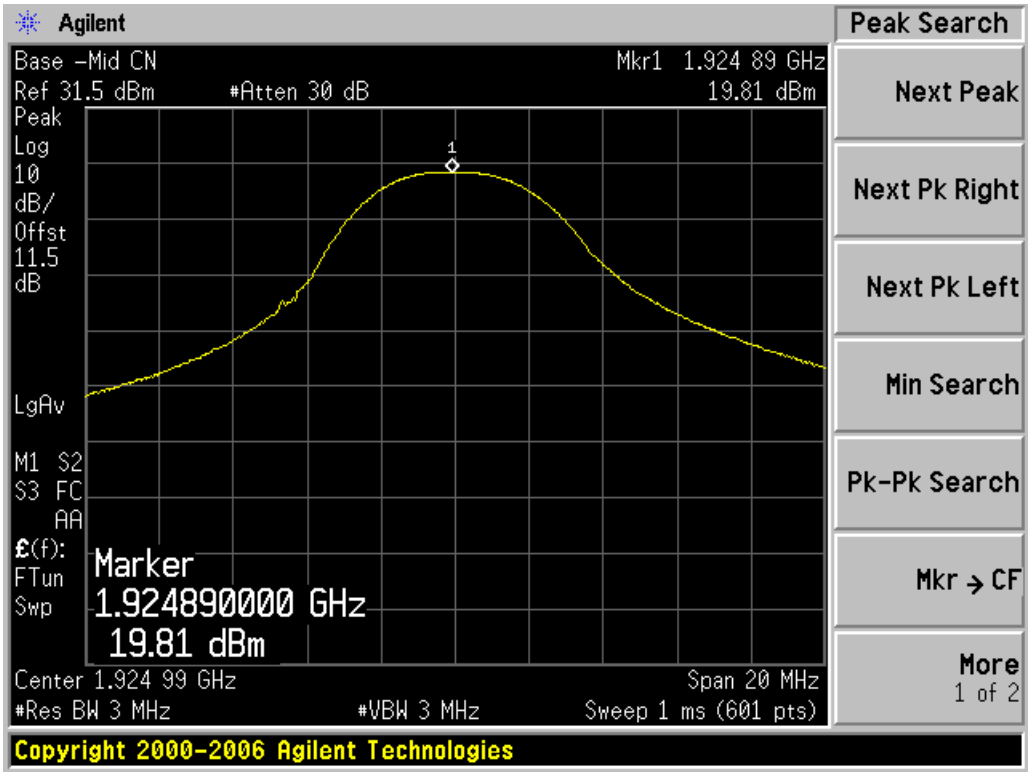
The limit for Peak Transmit Power (PTP) is calculated using the following formula:
PTP = 100 μ W x (EBW) $^{1/2}$
EBW is the transmit emission bandwidth in Hz determined in the other test item:
EBW = 2353000Hz
PTP = 100 μ W x (2353000) $^{1/2}$
PTP = 153.395 mW or 21.86 dBm

Channel	Frequency (MHz)	Max Peak Output Power		Limit (mw)
		(dBm)	(mw)	
Low	1921.536	18.85	76.74	153.39
Mid	1924.992	19.81	95.72	152.84
High	1928.448	18.97	78.89	152.84

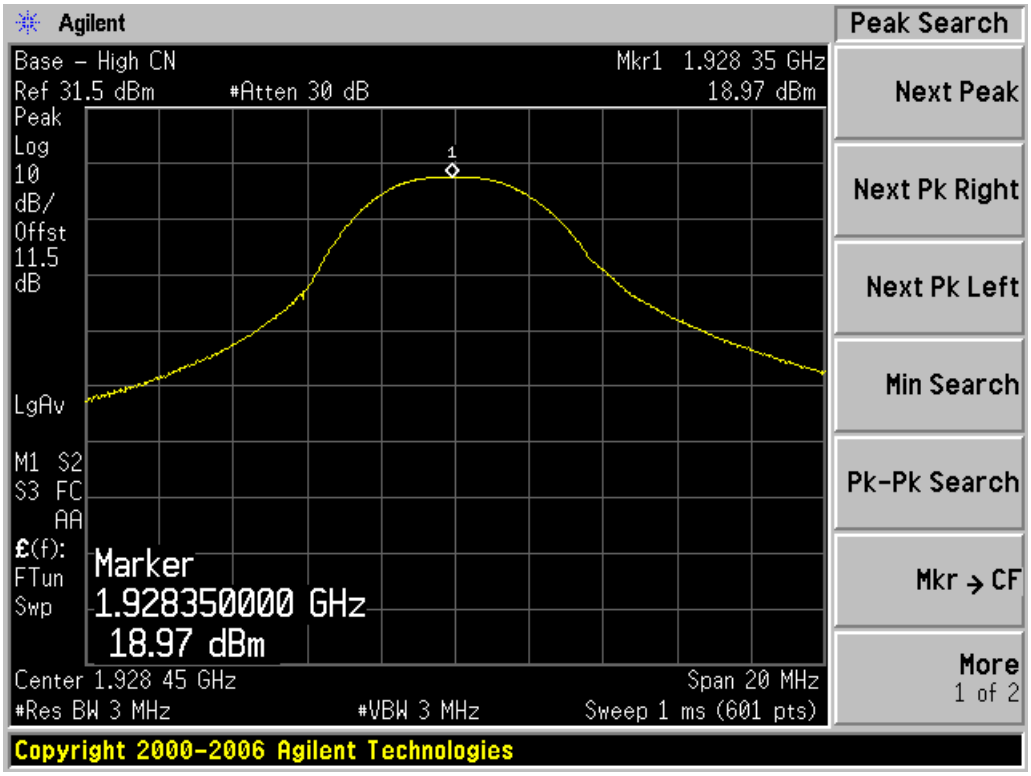
Low Channel



Middle Channel



High Channel



11 §15.319 (d) – POWER SPECTRAL DENSITY

11.1 Standard Applicable

According to §15.319 (d) Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

11.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2007-04-26

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

11.3 Test Procedure

Using the manufacturer's information on emission bandwidth set the spectrum analyzer as follows:

Resolution bandwidth (RBW) = 3 KHz
Video bandwidth (VBW) = 3 KHz
Frequency span = 1 MHz
Detection mode peak detection

11.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-11-12.*

11.5 Test Data

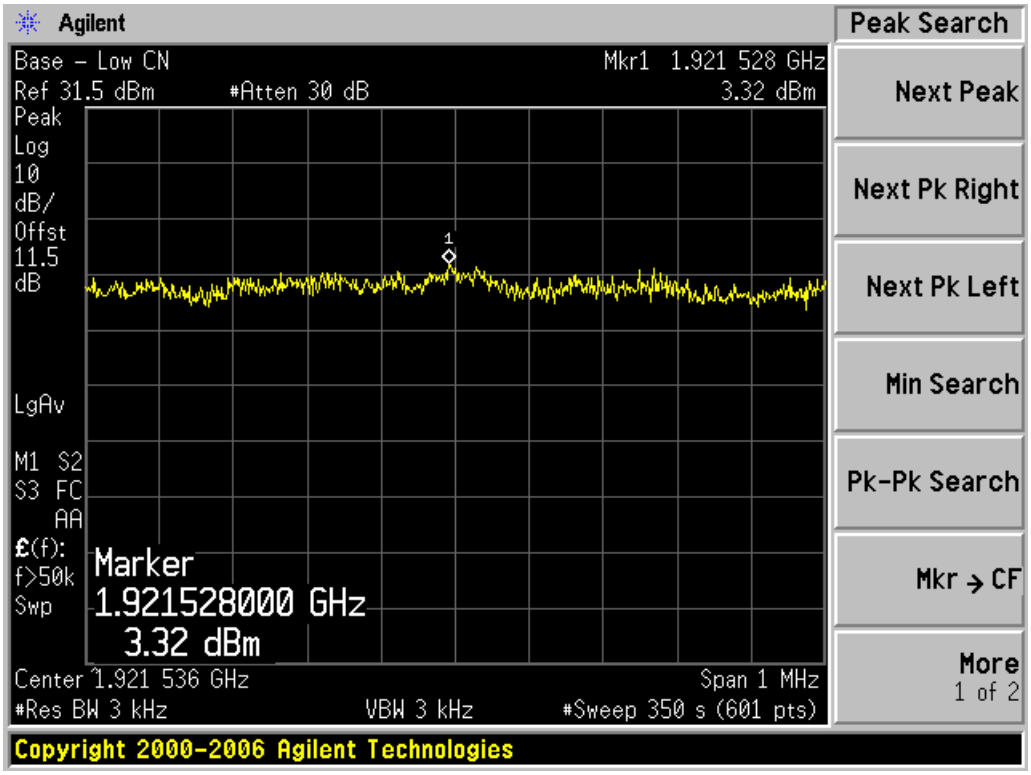
Test Result: Compliant

11.5.2 Test Data of Power Spectral Density:

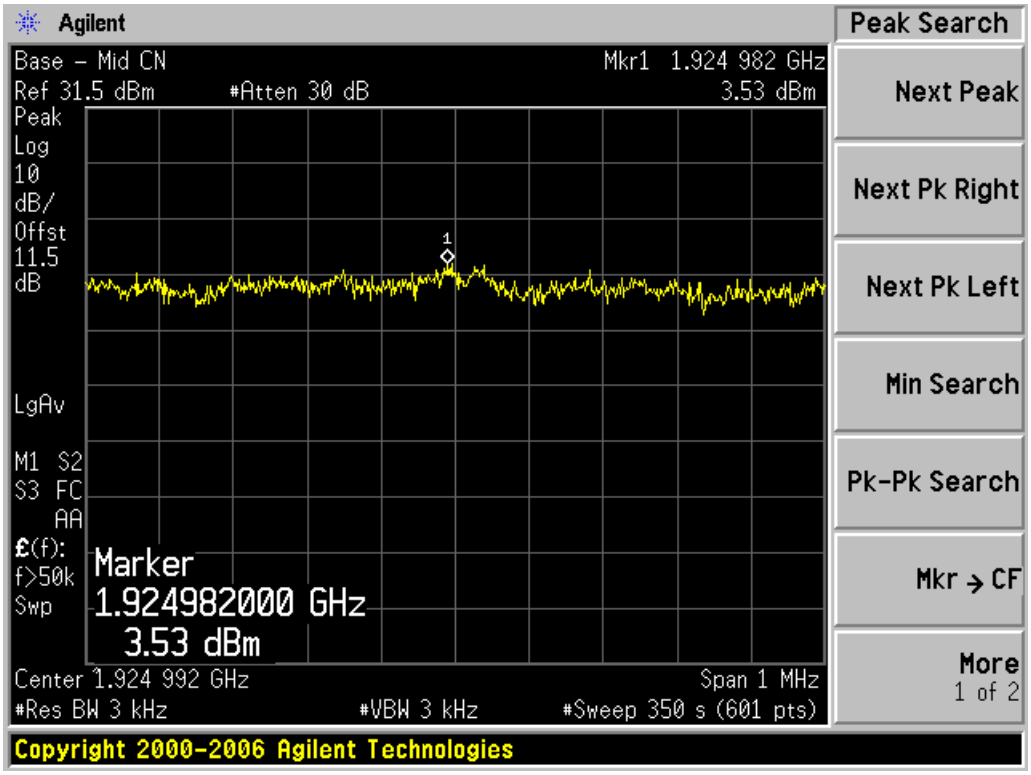
Base:

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Low	1921.536	3.32	4.77
Mid	1924.992	3.53	4.77
High	1928.448	3.19	4.77

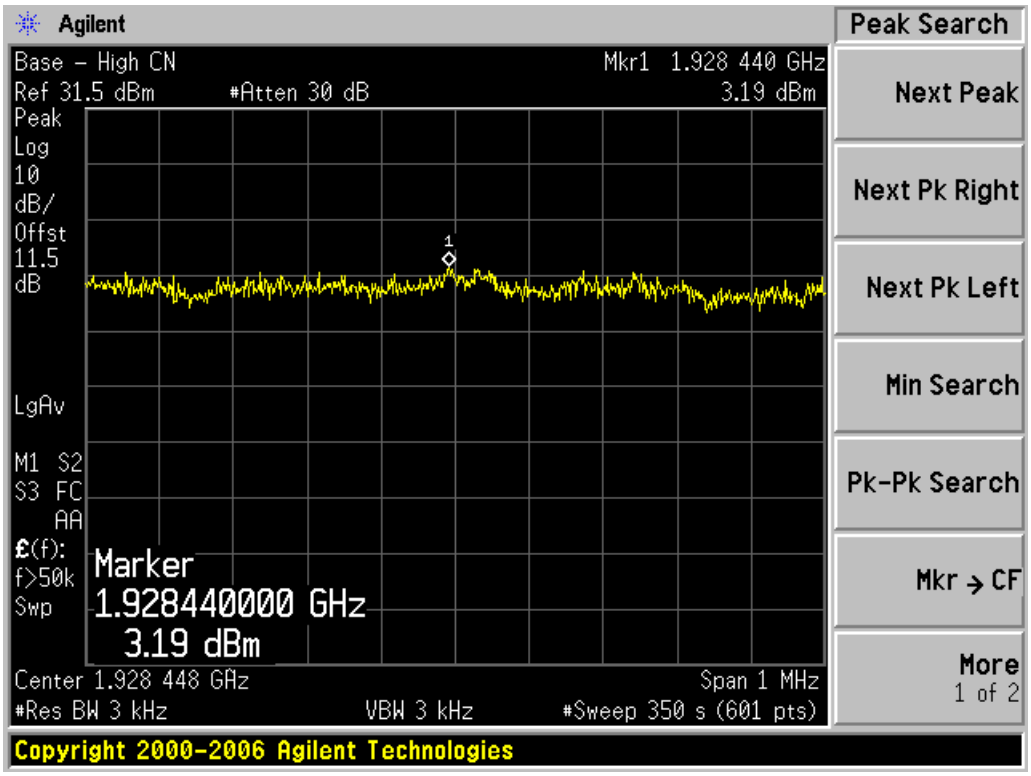
Low Channel



Middle Channel



High Channel



12 §15.323(d) – TRANSMITTER UNWANTED EMISSIONS

12.1 Standard Applicable

According to §15.323(d)

Minimum Standard: Emissions outside the 1920-1930 MHz Band

Emissions outside the 1920-1930 MHz band shall be attenuated below a reference power of 112 milliwatts (-9.5 dB W) as follows:

- 30 dB between the band edges and 1.25 MHz above or below the channel edges; i.e.-39.5 dBw.

-50 dB between 1.25 and 2.5MHz above or below the band edges; i.e. -59.5 dBw.

-60 dB at 2.5MHz or greater above or below the band edges. i.e.-69.5 dBW

Minimum Standard: Emissions inside the 1920-1930 MHz Band

Emissions inside the 1920-1930 MHz band shall be attenuated below the transmit power permitted for that device, as follows:

-30 dB between the frequencies 1B and 2B measured from the center of the occupied bandwidth;
-50 dB between the frequencies 2B and 3B measured from the center of the occupied bandwidth;
-60 dB between the frequencies 3B and band edge, where B is the occupied bandwidth in Hz

Where B is the occupied bandwidth in hertz.

12.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2007-04-26

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

12.3 Test Procedure

Uses the spectrum analyzer in the peak-hold mode.

An alternative method is as follows:

Set the spectrum analyzer as follows:

Resolution	30 KHz
Video bandwidth	100 KHz
Frequency span	10 MHz, 20 MHz, 100 MHz
Sweep time	Auto
Trace	Max. Hold

12.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

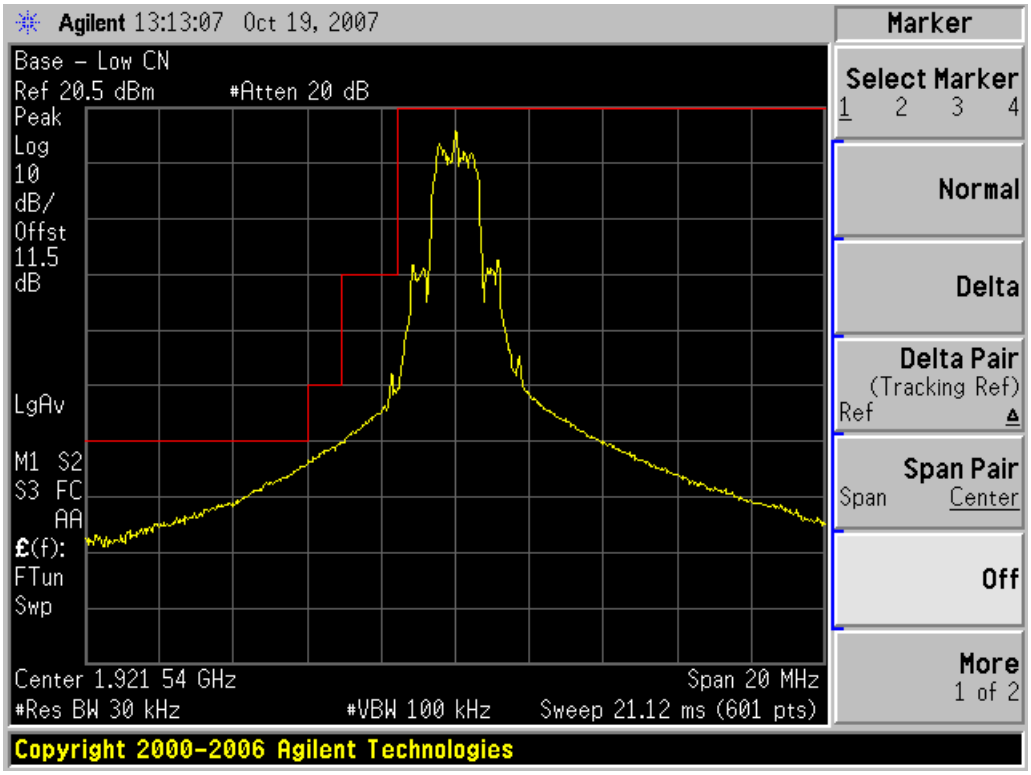
**The testing was performed by James Ma from 2007-11-12.*

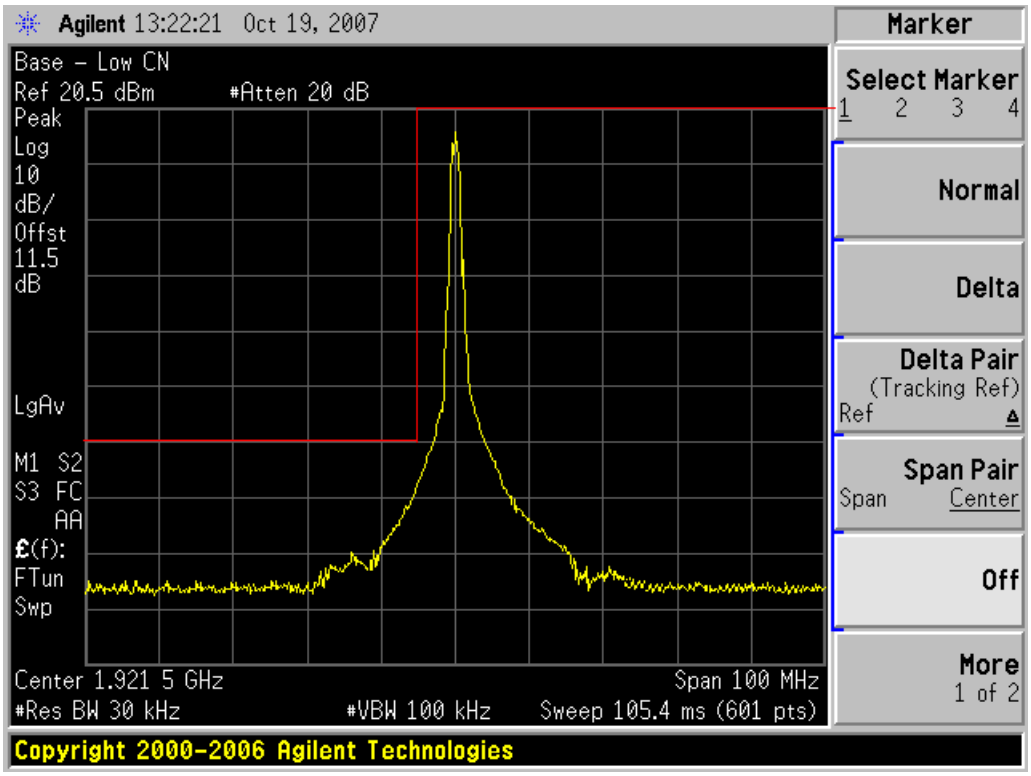
12.5 Test Data

Compliant, please refer to the following plots.

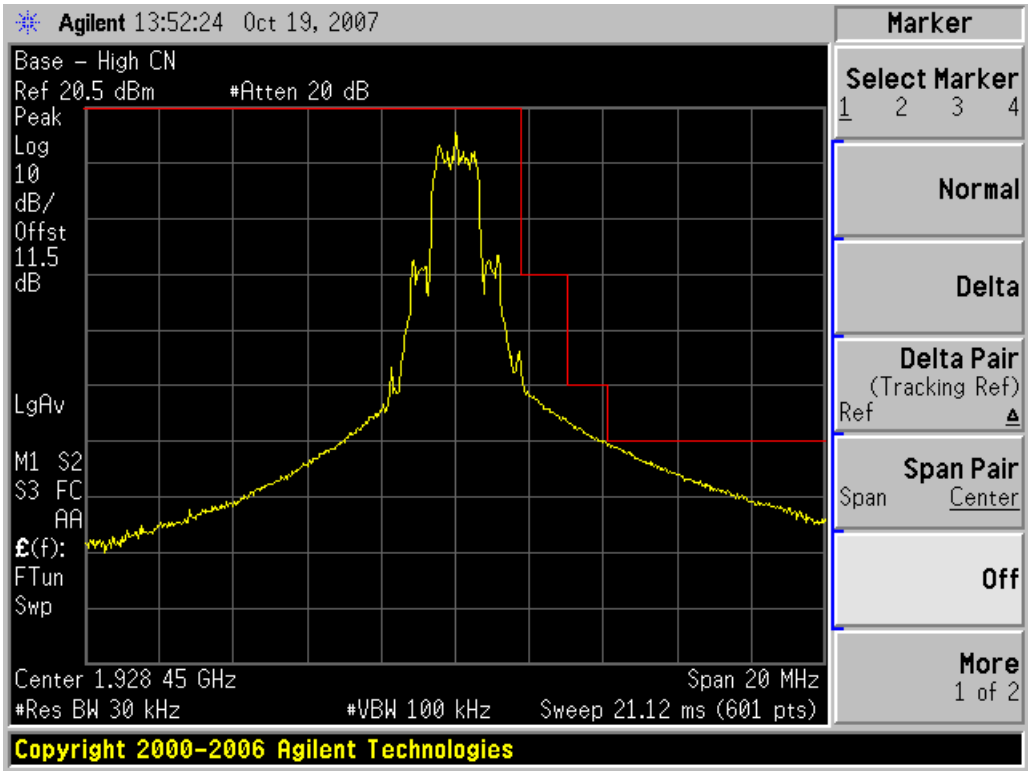
Outside the 1920 – 1930 MHz band unwanted emission

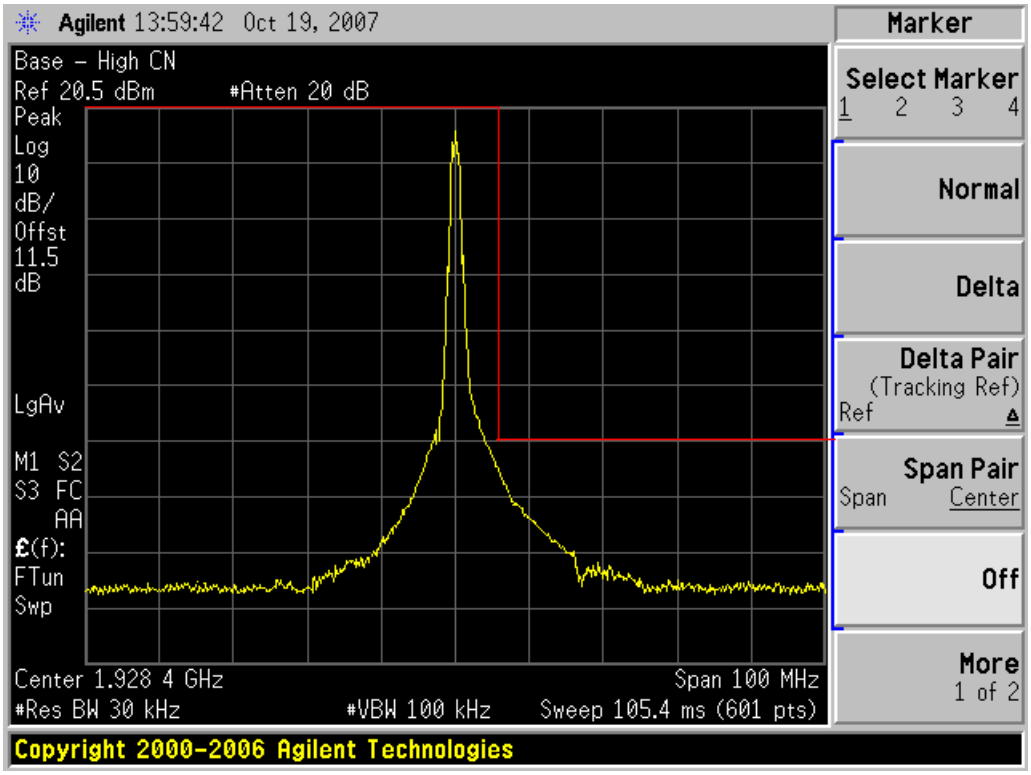
Low band edge





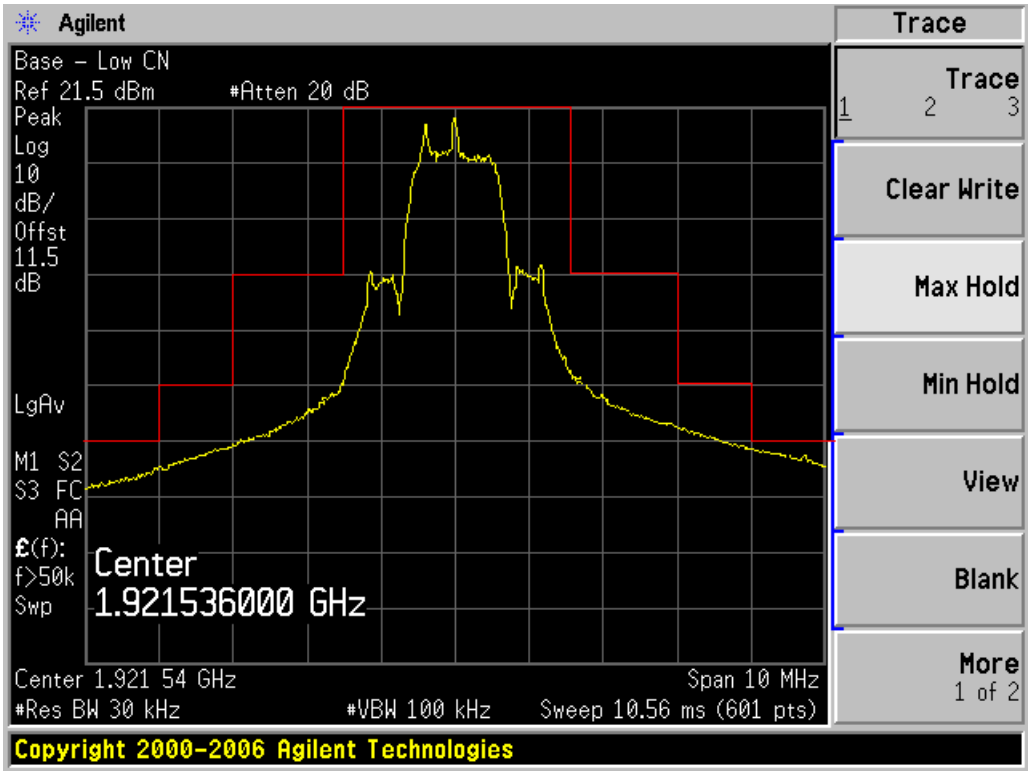
High band edge



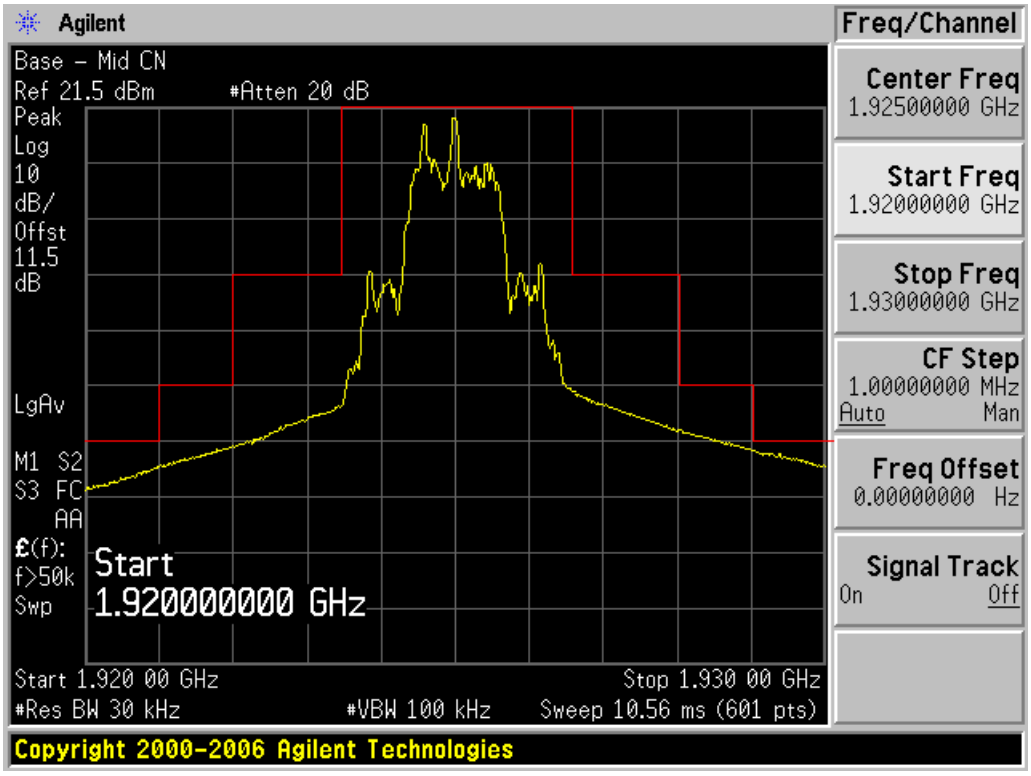


Inside the 1920 – 1930 MHz band unwanted emission

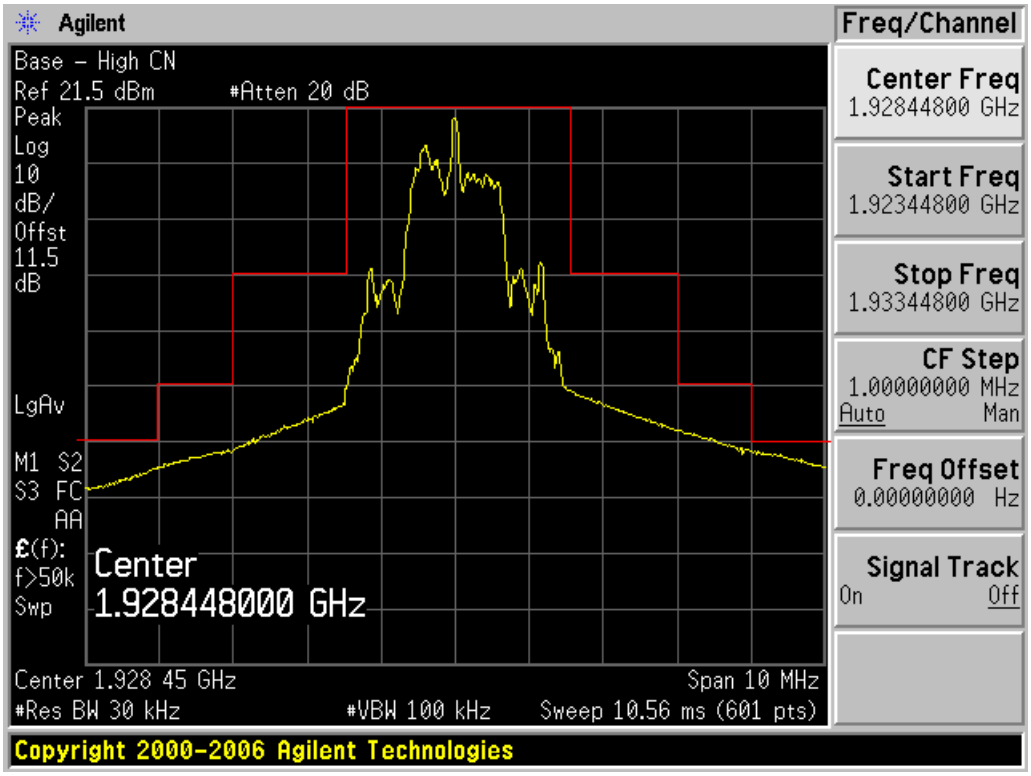
Low CH



Mid CH



High CH



13 §15.205, §15.209 - SPURIOUS RADIATED EMISSIONS

13.1 Applicable Standard

As per 15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per 15.209(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 (micro volts/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.

As Per 15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

13.2 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.

13.3 EUT Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15C 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.

13.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Pre amplifier	8449B	3147A00400	2007-11-02
Agilent	Spectrum Analyzer	E4440A	MY44303352	2007-23-07
A.R.A	Antenna Horn	DRG-118/A	1132	2007-06-18

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

13.5 Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

13.6 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:

Corrected Amplitude = 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.
The equation for margin calculation is as follows:

Margin = Corrected Amplitude - FCC Limit

13.7 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	56 %
ATM Pressure:	104.1kPa

** The testing was performed by James Ma from 2007-11-13.*

13.8 Summary of Test Results

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

-11.5 dB at **3843.07 MHz** in the **Vertical** polarization for Low Channel, 1GHz – 20GHz
-10.7 dB at **3849.98 MHz** in the **Vertical** polarization for Middle Channel, 1GHz – 20GHz
-11.3 dB at **3856.90 MHz** in the **Vertical** polarization for High Channel, 1GHz – 20GHz

13.9 Radiated Spurious Emissions Test Data, 1 GHz – 20 GHz:

Low channel 1921.536 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Ant. Height (m)	Ant. Polar. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
3843.07	61.3	300	1.3	V	30.8	6.0	35.6	62.5	74	-11.5	Peak
3843.07	59.4	0	2.0	H	30.8	6.0	35.6	60.6	74	-13.4	Peak
3843.07	32.9	300	1.3	V	30.8	6.0	35.6	34.0	54	-20.0	Ave
3843.07	31.0	0	2.0	H	30.8	6.0	35.6	32.1	54	-21.9	Ave
5764.61	49.7	90	2.0	V	34.7	6.7	33.3	57.7	74	-16.3	Peak
5764.61	48.3	200	1.0	H	34.7	6.7	33.3	56.3	74	-17.7	Peak
5764.61	21.3	90	2.0	V	34.7	6.7	33.3	29.3	54	-24.7	Ave
5764.61	19.9	200	1.0	H	34.7	6.7	33.3	27.9	54	-26.1	Ave

Middle channel 1924.992 MHz

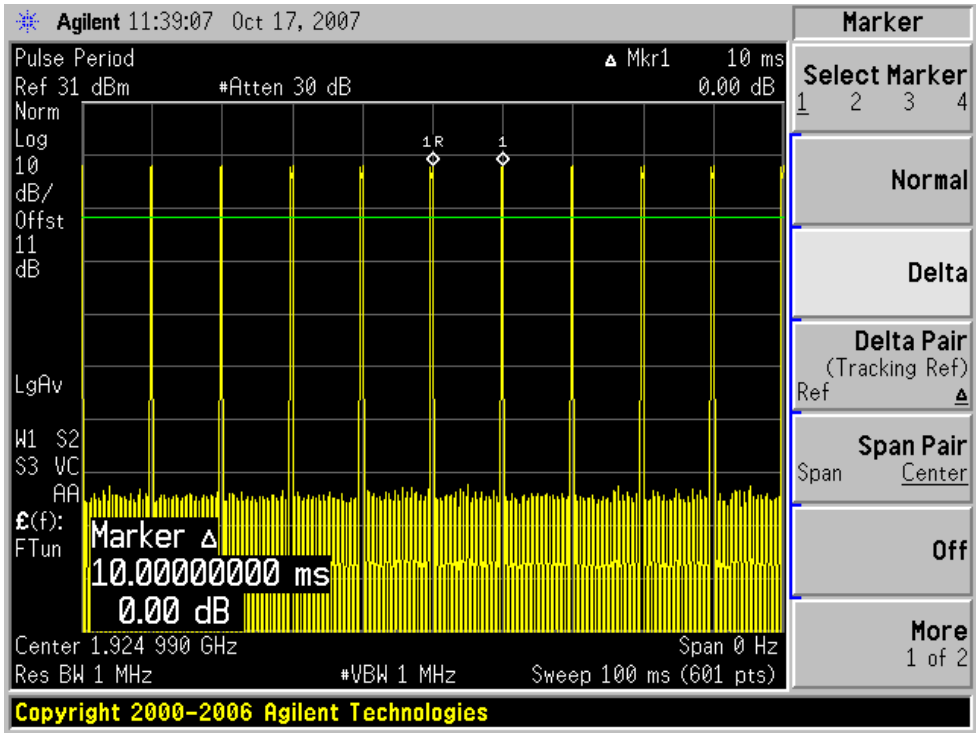
Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Ant. Height (m)	Ant. Polar. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
3849.98	62.1	35	1.5	V	30.8	6.0	35.6	63.3	74	-10.7	Peak
3849.98	60.7	160	2.2	H	30.8	6.0	35.6	61.9	74	-12.1	Peak
3849.98	33.7	35	1.5	V	30.8	6.0	35.6	34.8	54	-19.2	Ave
3849.98	32.3	160	2.2	H	30.8	6.0	35.6	33.4	54	-20.6	Ave
5774.98	50.2	30	1.3	V	34.7	6.7	33.3	58.2	74	-15.8	Peak
5774.98	48.6	180	1.0	H	34.7	6.7	33.3	56.6	74	-17.4	Peak
5774.98	21.8	30	1.3	V	34.7	6.7	33.3	29.8	54	-24.2	Ave
5774.98	20.2	180	1.0	H	34.7	6.7	33.3	28.2	54	-25.8	Ave

High channel 1928.448 MHz

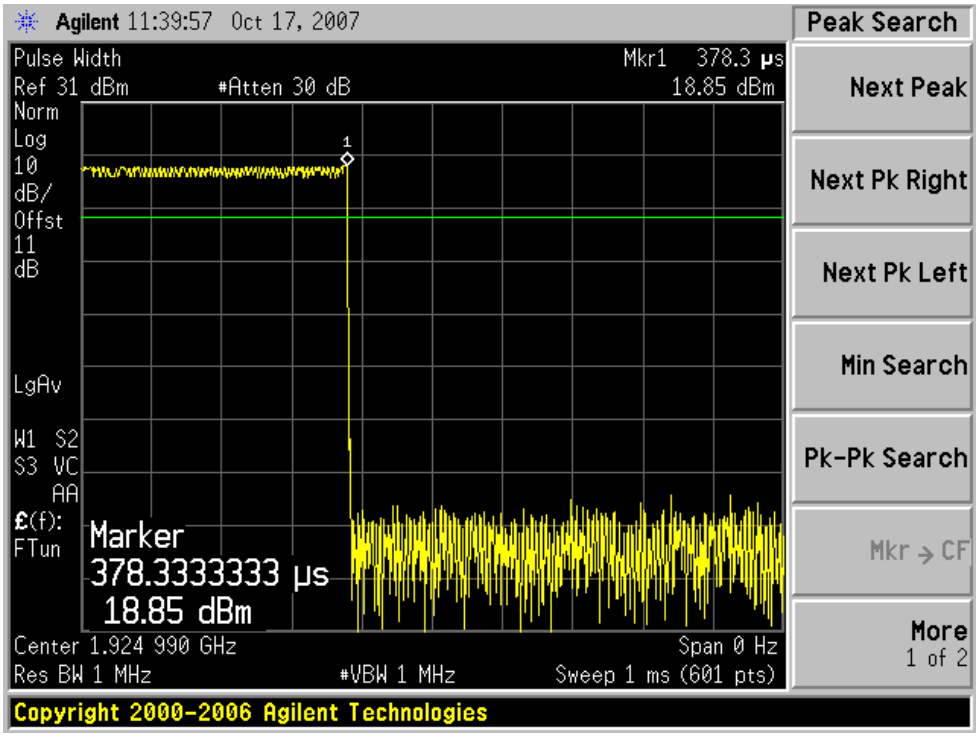
Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Ant. Height (m)	Ant. Polar. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
3856.90	61.5	60	2.0	V	30.8	6.0	35.6	62.7	74	-11.3	Peak
3856.90	59.9	90	2.1	H	30.8	6.0	35.6	61.1	74	-12.9	Peak
3856.90	33.1	60	2.0	V	30.8	6.0	35.6	34.2	54	-19.8	Ave
3856.90	31.5	90	2.1	H	30.8	6.0	35.6	32.6	54	-21.4	Ave
5785.34	49.8	270	2.4	V	34.7	6.7	33.3	57.8	74	-16.2	Peak
5785.34	48.3	180	1.2	H	34.7	6.7	33.3	56.3	74	-17.7	Peak
5785.34	21.4	270	2.4	V	34.7	6.7	33.3	29.4	54	-24.6	Ave
5785.34	19.9	180	1.2	H	34.7	6.7	33.3	27.9	54	-26.1	Ave

PP = 10 ms, PW = 0.378 ms ==> Duty Cycle = 3.78 % (See plots)

Pulse Period



Pulse Width



14 §15.309, §15.109 – RECEIVER SPURIOUS EMISSIONS

14.1 Applicable Standard

As per 15.309 (b): The requirements of subpart D apply only to the radio transmitter contained in the PCS device. Other aspects of the operation of a PCS device may be subject to requirements contained elsewhere in this chapter. In particular, a PCS device that includes digital circuitry not directly associated with the radio transmitter also is subject to the requirements for unintentional radiators in subpart B.

As per 15.109(a): Except as provided elsewhere in this Subpart, the radiated emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table

Table 1 – Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 meters)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

14.2 Test Setup

The radiated emissions tests were performed in the 3-meter chamber, using the setup in accordance with ANSI C63.4-2003.

14.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sonoma Instruments	Pre amplifier	317	260406	2007-04-30
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3	2007-03-05
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100044	2007-02-19
Sunol Science Corp	System Controller	SC99V	122303-1	N/R

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

14.4 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 emissions was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**QP**" in the data table.

14.5 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:

Corrected Amplitude = 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. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

14.6 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

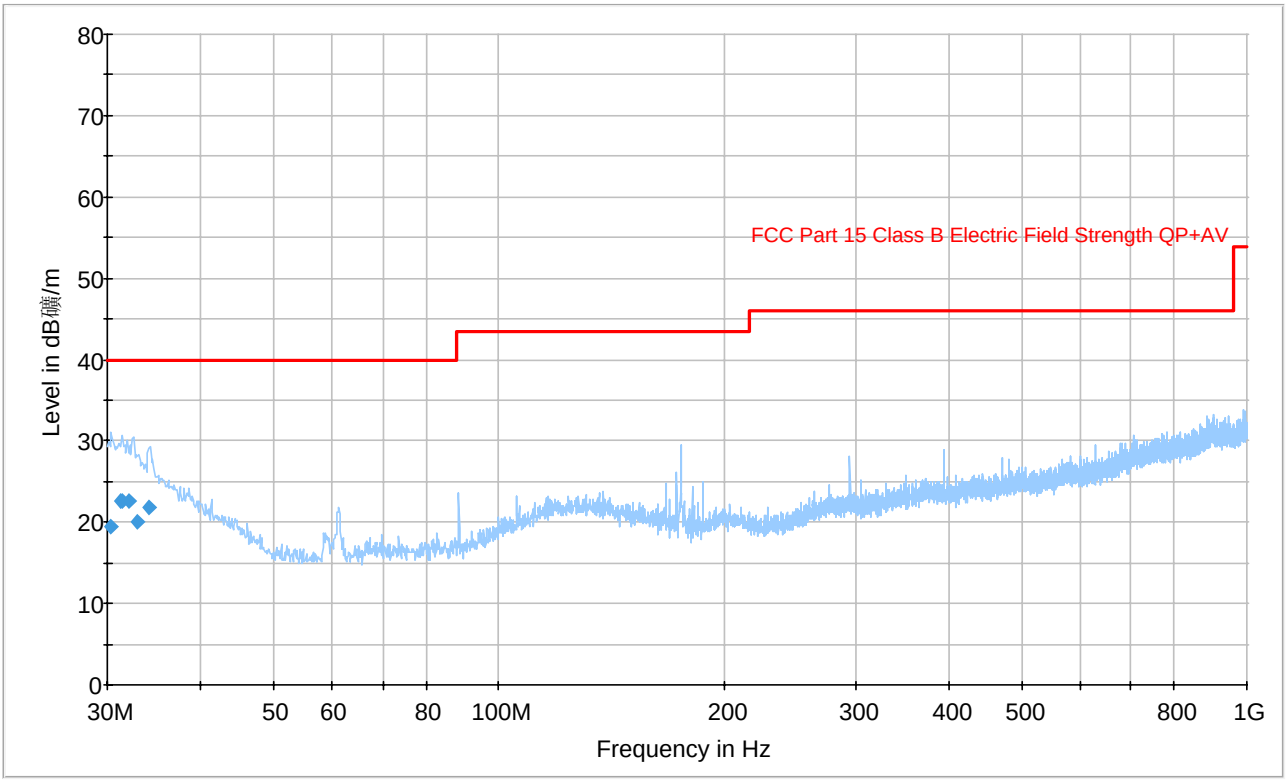
**The testing was performed by James Ma from 2007-11-13.*

14.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the 15.309 & 15.109, and had the worst margin of:

-17.3 dB at **31.211250 MHz** in the **Vertical** polarization.

14.8 Test Data



Frequency (MHz)	Quasi-Peak (dBµV/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Cord. Factor (dB)	Limit (dBµV/m)	Margin (dB)
31.211250	22.7	99.0	V	316.0	5.0	40.0	17.3
31.455000	22.6	314.0	H	308.0	4.8	40.0	17.4
32.066250	22.6	98.0	V	176.0	4.3	40.0	17.4
34.083750	21.8	180.0	H	-6.0	2.8	40.0	18.2
32.871250	20.1	202.0	H	193.0	3.7	40.0	19.9
30.240000	19.5	244.0	H	319.0	5.8	40.0	20.5