FCC Type Approval

EMI MEASUREMENT AND TEST REPORT

For

High Tech Computer, Corp.

23, Hsin-Hua Rd.,
Taoyuan, 330 Taiwan

FCC ID: NM8TP

2004-05-14

This Report Concerns:	**Equipment Type:**
☒ Original Report	GSM/GPRS 1900MHz Bluetooth Smartphone

Test Engineer:	Ling Zhang /
Report No.:	R0404262
Test Date:	2004-04-29
Reviewed By:	Hans Mellberg /
Prepared By:	**B**ay 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 *High Tech Computer, Corp.'s* product, model no.: ST20A or the "EUT" as referred to this report is a GSM/GPRS 1900MHz Bluetooth Smartphone which measures approximately 108mmL x 48mmW x 17mmH.

** The test data gathered are from typical production sample, serial number: HT416DB00046 , provided by the manufacturer.*

Objective

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

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

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

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

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

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

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

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

Test Facility

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

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

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

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

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2001 & TIA/EIA-603.

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

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

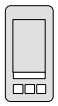
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Agilent	Wireless communication test set	8960	GB44051221	DOC

Power Supply Information

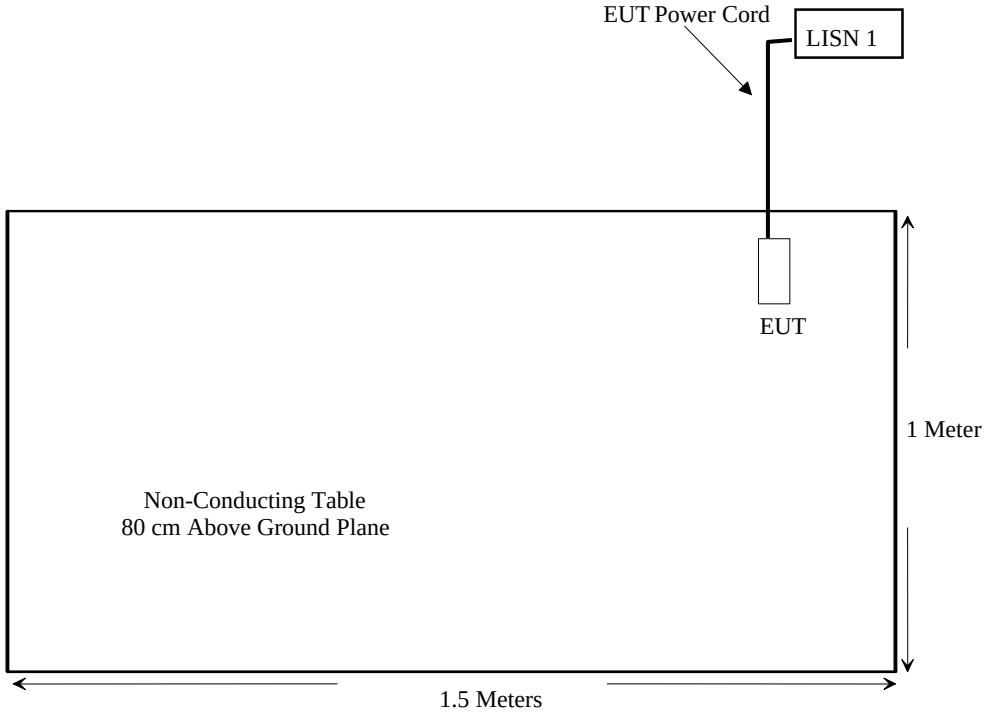
Manufacturer	Description	Model	Serial Number	FCC ID
PHIHONG	AC Adapter	PSC05R-050	N/A	DOC

Configuration of Test System



EUT

Test Setup Block Diagram



SUMMARY OF TEST RESULTS FOR FCC PART 15

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

ANTENNA REQUIREMENT

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

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

The gain of antenna used for transmitting is 0.49 dBi by default, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

§15.207(a) - CONDUCTED EMISSION

Measurement Uncertainty

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

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

Test Setup

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

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

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

Spectrum Analyzer Setup

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	LISN	ESH2-Z5	871884/039	2004-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-05-06
Fluke	Calibrated Voltmeter	189	18485-38	2003-07-18

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

Test Procedure

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

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

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

Environmental Conditions

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

The testing was performed by Ling Zhang on 2004-05-04.

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:

-12.09 dB at **0.18 MHz** in the **Line** conductor

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.18	52.4	QP	Line	64.5	-12.09
0.55	33.5	AVG	Neutral	46.0	-12.50
0.18	51.6	QP	Neutral	64.5	-12.89
0.18	41.5	AVG	Line	54.5	-12.99
0.51	32.9	AVG	Line	46.0	-13.10
0.18	40.4	AVG	Neutral	54.5	-14.09
0.21	48.4	QP	Line	63.2	-14.81
0.51	40.9	QP	Line	56.0	-15.10
0.21	36.3	AVG	Line	53.2	-16.91
0.55	38.1	QP	Neutral	56.0	-17.90
4.54	24.9	AVG	Neutral	46.0	-21.10
0.92	24.9	QP	Neutral	56.0	-31.10

Plot of Conducted Emissions Test Data

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

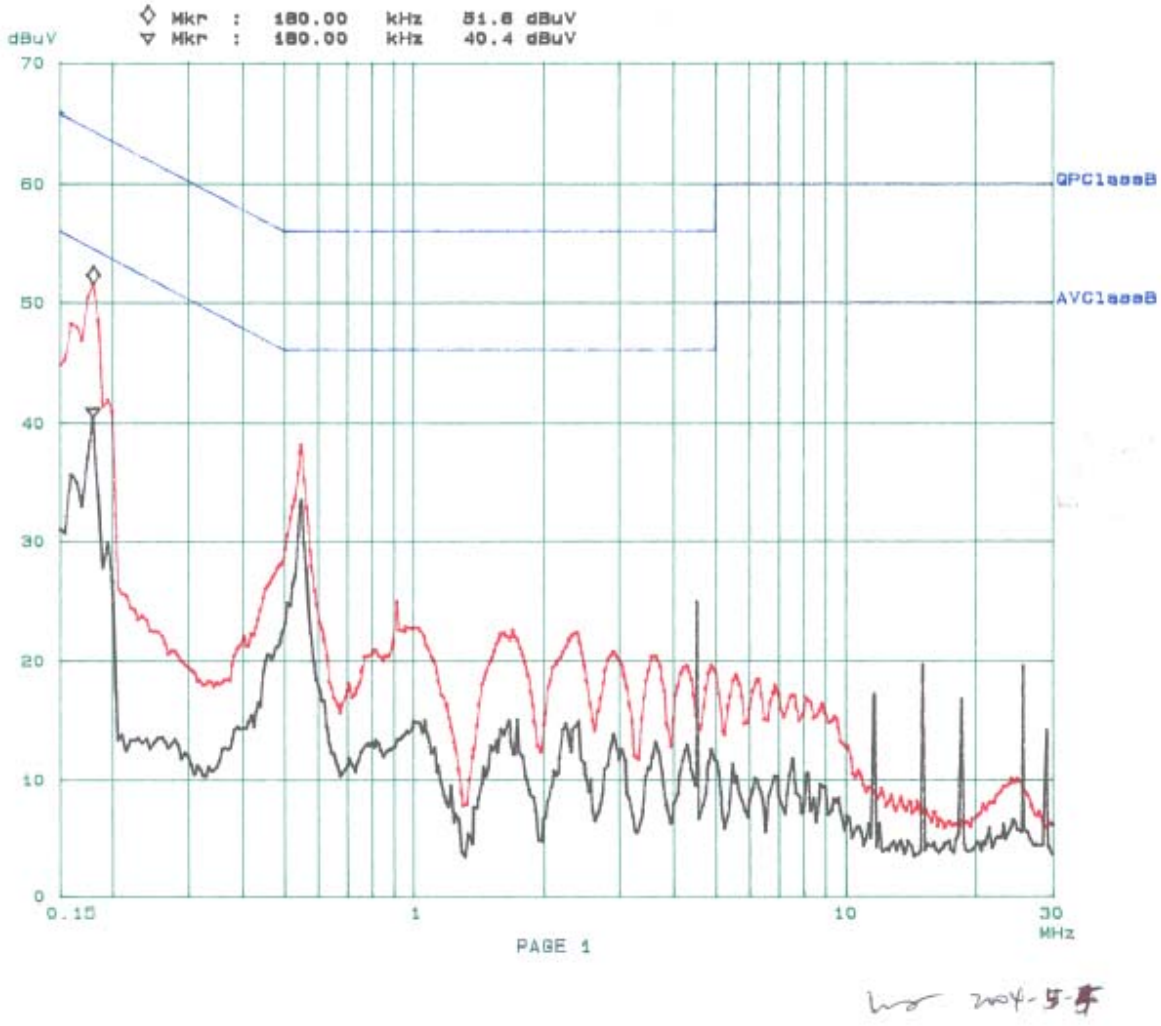
Bay Area Compliance Lab Corp 05. May 04 08: 15
Class B

EUT: ST20A
Manuf: HTC
Op Cond: Normal
Operator: LING
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	50k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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Bay Area Compliance Lab Corp 04. May 04 16:20

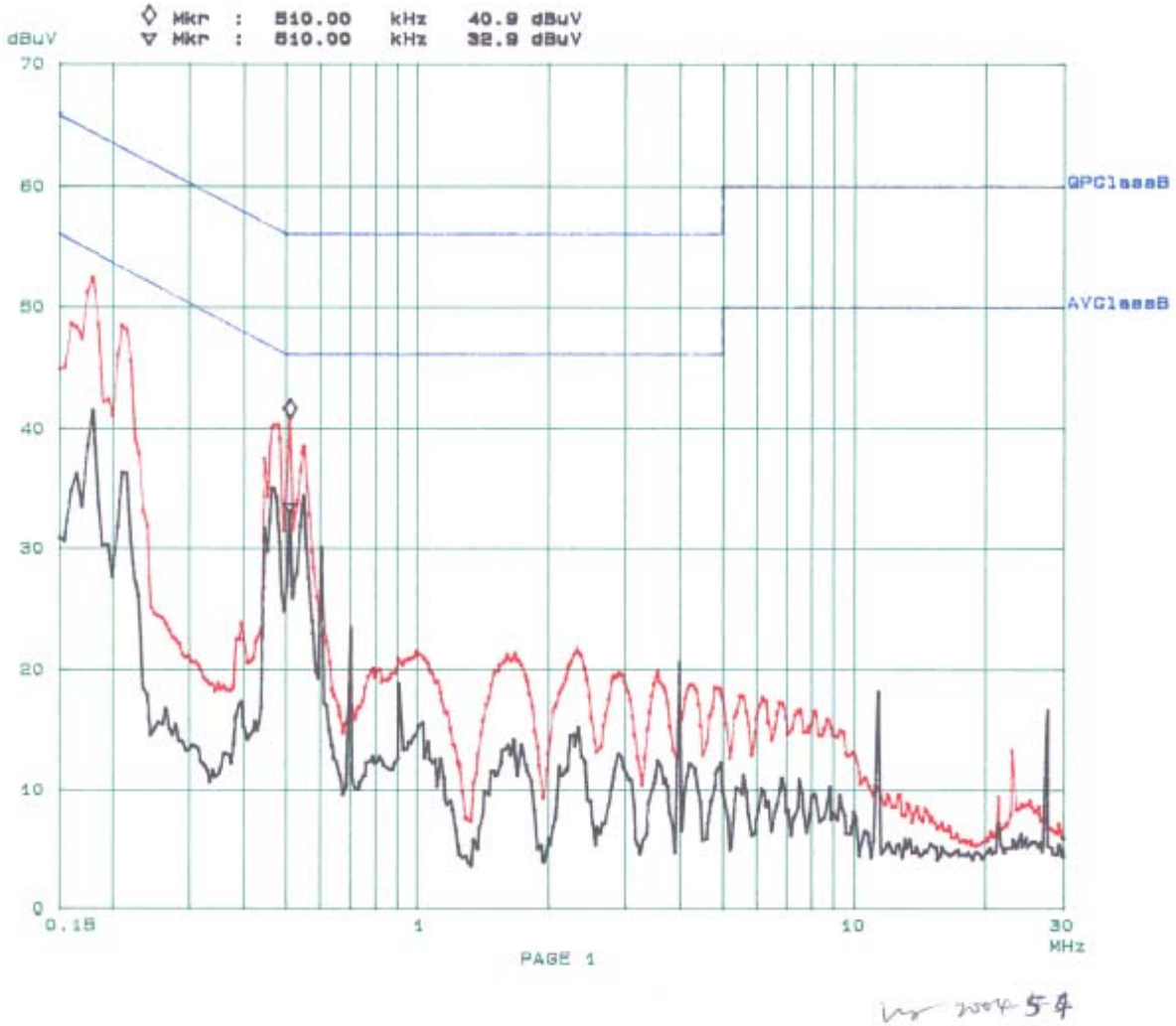
Class B

EUT: ST20A
Manuf: HTC
Op Cond: Normal
Operator: LING
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	50k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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§15.205 & §15.209 - RADIATED EMISSION

Measurement Uncertainty

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

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

Test Setup

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

The spacing between the peripherals was 10 centimeters.

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

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

Spectrum Analyzer Setup

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-03-14
HP	Amplifier, Pre	8447E	1937A01057	2003-08-04
HP	Analyzer, Spectrum	8565EC	3946A00131	2003-06-30
ETS	Antenna, Biconical	3110B	9603-2315	2003-01-11
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2003-09-30
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2003-08-01
ETS	Antenna, logperiodic	3148	0004-1155	2003-10-11

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

Environmental Conditions

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

The testing was performed by Ling Zhang on 2004-05-04.

Test Procedure

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

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

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

Corrected Amplitude & Margin Calculation

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

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

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

Margin = Corr. Ampl. - Class B Limit

Summary of Test Results

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

Transmitter:

-13.76 dB at **7206 MHz** in the **Horizontal** polarization, Low Channel.

-13.73 dB at **7323 MHz** in the **Vertical** polarization, Middle Channel.

-13.93 dB at **7440 MHz** in the **Vertical** polarization, High Channel.

-12.84 dB at **135 MHz** in the **Vertical** polarization, Unintentional Emission.

Radiated Emission Test Data

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2402	94.0	180	1.6	V	28.1	3.35	35.60	89.85			Fund/Peak
2402	94.5	0	1.6	H	28.1	3.35	35.60	90.35			Fund/Peak
2402	59.7	180	1.6	V	28.1	3.35	35.60	55.52			Fund/Ave
2402	59.6	0	1.6	H	28.1	3.35	35.60	55.45			Fund/Ave
7206	33.7	60	1.4	H	36.3	5.97	35.70	40.24	54	-13.76	Ave
7206	33.5	250	1.2	V	36.3	5.97	35.70	40.07	54	-13.93	Ave
4804	36.3	0	1.5	V	32.5	4.91	34.75	38.99	54	-15.01	Ave
4804	36.0	250	1.5	H	32.5	4.91	34.75	38.66	54	-15.34	Ave
4804	53.0	0	1.5	V	32.5	4.91	34.75	55.66	74	-18.34	Peak
4804	53.0	250	1.5	H	32.5	4.91	34.75	55.66	74	-18.34	Peak
7206	46.2	60	1.4	H	36.3	5.97	35.70	52.74	74	-21.26	Peak
7206	46.0	250	1.2	V	36.3	5.97	35.70	52.57	74	-21.43	Peak
Middle Channel											
2441	93.5	60	1.2	V	28.1	3.35	35.60	89.35			Fund/Peak
2441	95.0	30	1.6	H	28.1	3.35	35.60	90.85			Fund/Peak
2441	58.5	60	1.2	V	28.1	3.35	35.60	54.35			Fund/Ave
2441	58.8	30	1.6	H	28.1	3.35	35.60	54.68			Fund/Ave
7323	33.7	180	1.5	V	36.3	5.97	35.70	40.27	54	-13.73	Ave
7323	33.6	30	1.4	H	36.3	5.97	35.70	40.17	54	-13.83	Ave
4882	35.2	270	1.5	H	32.5	4.91	34.75	37.83	54	-16.17	Ave
4882	35.0	0	1.4	V	32.5	4.91	34.75	37.66	54	-16.34	Ave
4882	51.5	0	1.4	V	32.5	4.91	34.75	54.16	74	-19.84	Peak
4882	51.3	270	1.5	H	32.5	4.91	34.75	53.99	74	-20.01	Peak
7323	46.3	180	1.5	V	36.3	5.97	35.70	52.87	74	-21.13	Peak
7323	45.8	30	1.4	H	36.3	5.97	35.70	52.37	74	-21.63	Peak
High Channel											
2480	92.3	270	1.6	V	28.1	3.35	35.60	88.18			Fund/Peak
2480	94.2	0	1.5	H	28.1	3.35	35.60	90.05			Fund/Peak
2480	57.5	270	1.6	V	28.1	3.35	35.60	53.35			Fund/Ave
2480	58.0	0	1.5	H	28.1	3.35	35.60	53.85			Fund/Ave
7440	33.5	0	1.6	V	36.3	5.97	35.70	40.07	54	-13.93	Ave
7440	33.5	180	1.4	H	36.3	5.97	35.70	40.07	54	-13.93	Ave
4960	34.5	180	1.2	V	32.5	4.91	34.75	37.16	54	-16.84	Ave
4960	34.2	90	1.6	H	32.5	4.91	34.75	36.86	54	-17.14	Ave
4960	50.5	180	1.2	V	32.5	4.91	34.75	53.16	74	-20.84	Peak
4960	50.0	90	1.6	H	32.5	4.91	34.75	52.66	74	-21.34	Peak
7440	46.0	180	1.4	H	36.3	5.97	35.70	52.57	74	-21.43	Peak
7440	45.9	0	1.6	V	36.3	5.97	35.70	52.47	74	-21.53	Peak

Note:

FUND: Fundemental
AVG: Average

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB
135.0	45.3	60	1.2	V	12.2	1.62	28.49	30.66	44	-12.84
135.0	44.5	250	1.6	H	12.2	1.62	28.49	29.83	44	-13.67
290.3	43.5	150	1.4	H	13.7	2.30	27.84	31.66	46	-14.34
290.3	41.5	330	1.0	V	13.7	2.30	27.84	29.66	46	-16.34
485.9	34.7	180	1.6	V	18.3	3.10	28.78	27.29	46	-18.71
485.9	33.5	45	1.0	V	18.3	3.10	28.78	26.12	46	-19.88
246.8	38.0	250	1.0	V	13.8	2.17	28.04	25.93	46	-20.07
246.8	35.5	180	1.5	H	13.8	2.17	28.04	23.43	46	-22.57

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

Standard Applicable

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

Measurement Procedure

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

Test Equipment

Manufacturer	Model No.	Description	Calibration Date
Agilent	8564E	Spectrum Analyzer	2003-08-01

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

Environmental Conditions

Temperature:	25° C
Relative Humidity:	42%
ATM Pressure:	1025 mbar

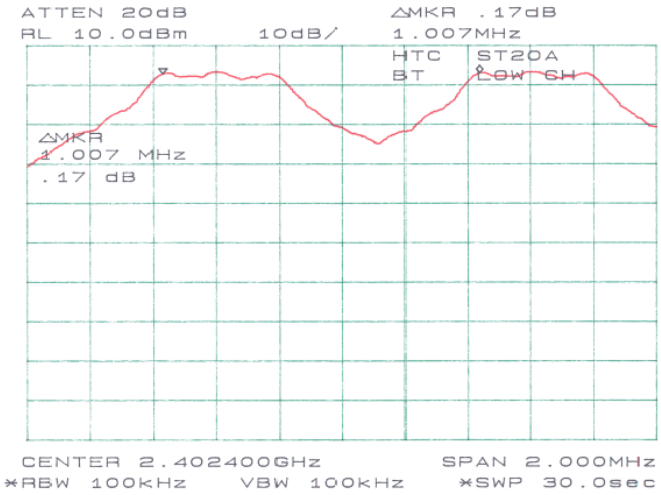
The testing was performed by Ling Zhang on 2004-05-03.

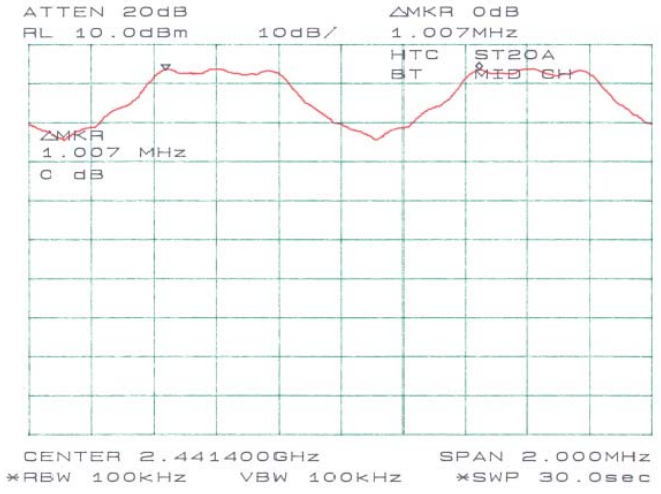
Measurement Results

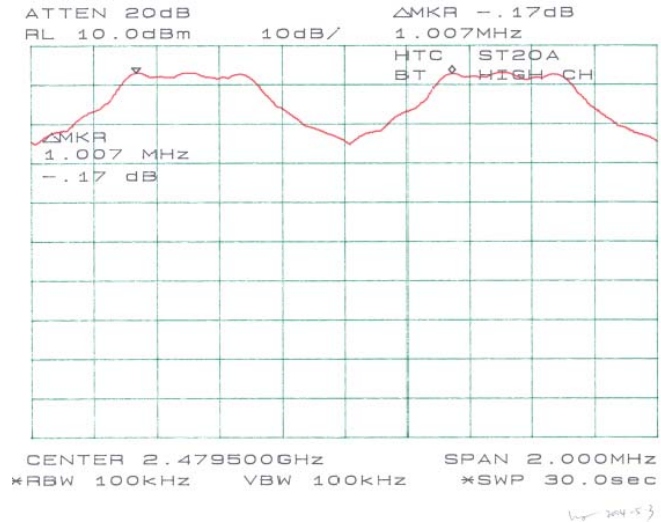
Channel	Measurement (MHz)	Result
Low	1.007	Compliant
Middle	1.007	Compliant
High	1.007	Compliant

Plots of Hopping Channel Separation

Please refer to the following plots.







§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

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

Measurement Procedure

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

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2003-08-01

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

Environmental Conditions

Temperature:	23° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

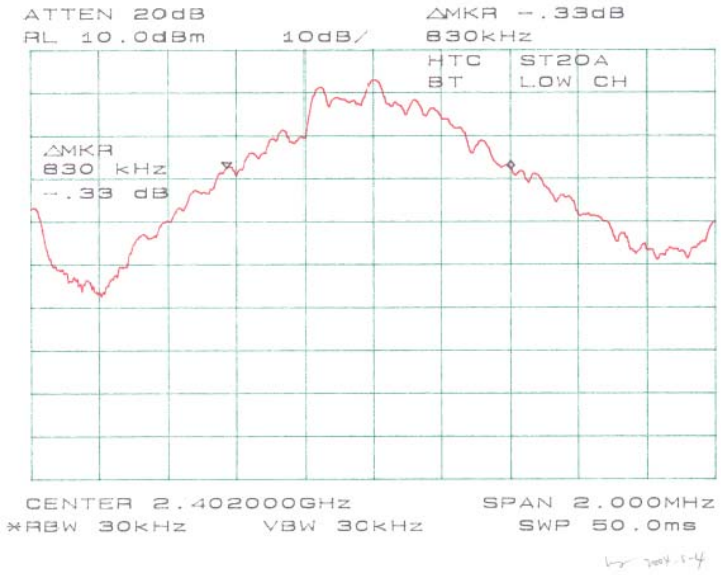
The testing was performed by Ling Zhang on 2004-05-04.

Measurement Result

Frequency	Measurement (kHz)	Standard	Result
Low	830	≤ 1MHz	Compliant
Middle	830	≤ 1MHz	Compliant
High	830	≤ 1MHz	Compliant

Plot of Channel Bandwidth

Please see the following plots


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -.33dB
830kHz
HTC ST20A
BT LOW CH
ΔMKR
830 kHz
-.33 dB
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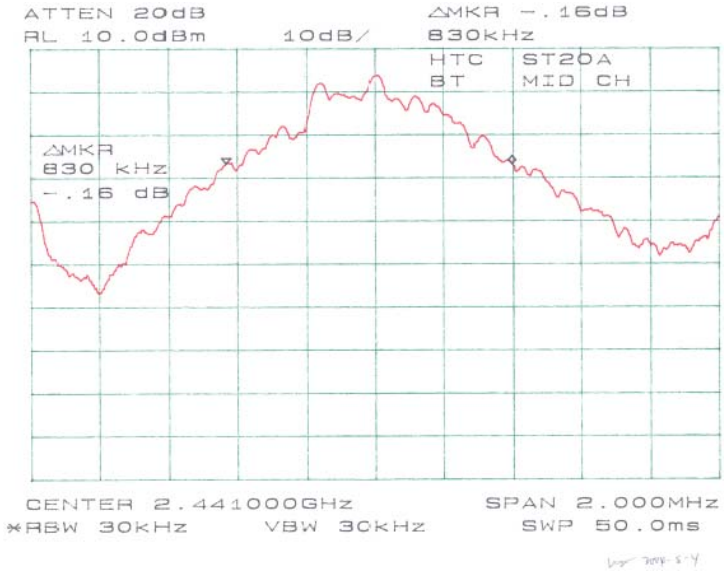
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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10dB/
ΔMKR -.16dB
830kHz
HTC ST20A
BT MID CH
ΔMKR
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-.16 dB
CENTER 2.441000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -.17dB
830kHz
HTC ST20A
BT HIGH CH
ΔMKR
830 kHz
-.17 dB
CENTER 2.480000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

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

Standard Applicable

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

Measurement Procedure

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

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2003-08-01

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

Environmental Conditions

Temperature:	23° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

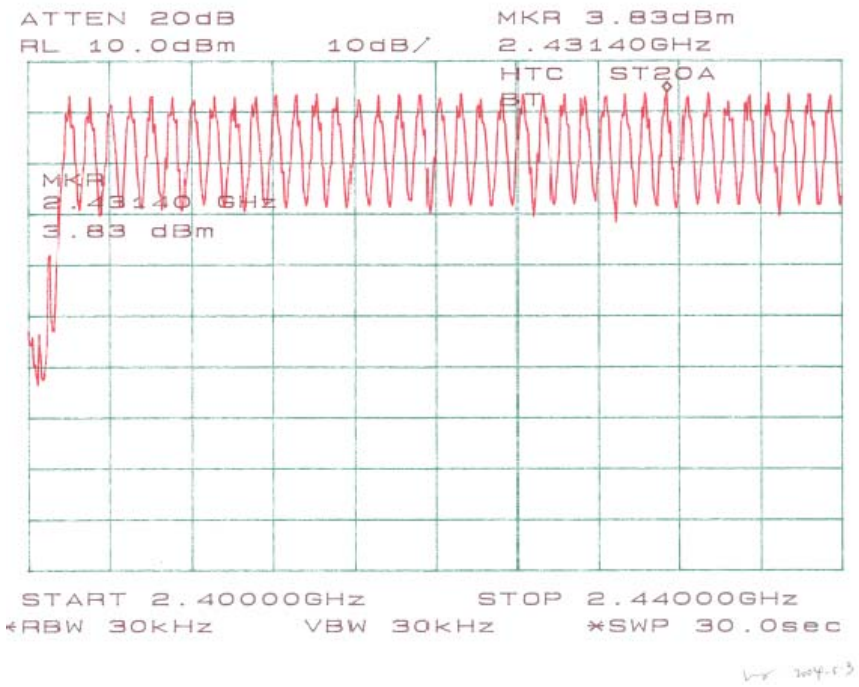
The testing was performed by Ling Zhang on 2004-05-03.

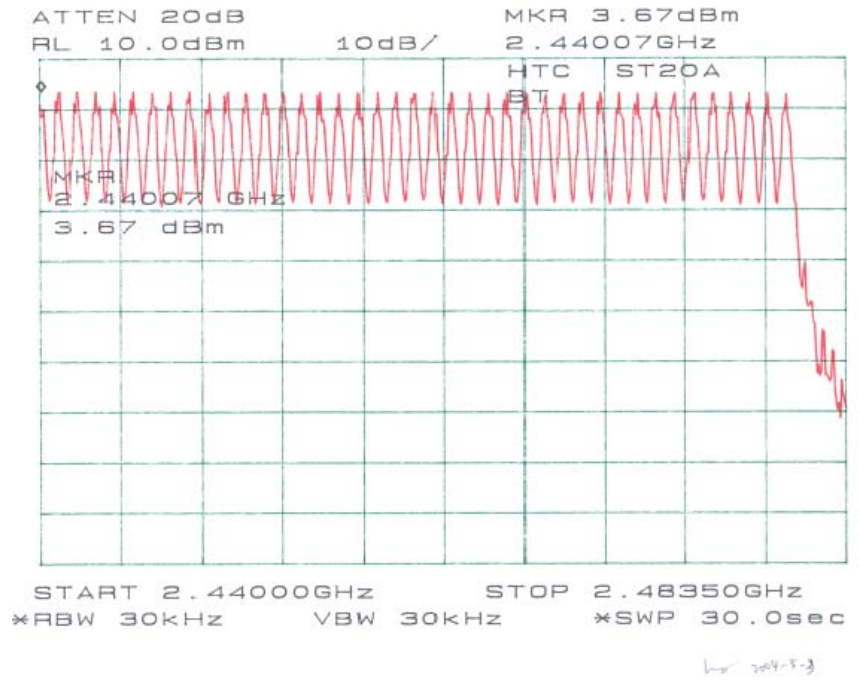
Measurement Results

Measurement	Standard	Result
79	75	Compliant

Plots of Number of Hopping Frequency

Please refer to the attached plots.


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.83dBm
2.43140GHz
HTC ST20A
BT
MKR
2.43140 GHz
3.83 dBm
START 2.40000GHz
STOP 2.44000GHz
*RBW 30kHz
VBW 30kHz
*SWP 30.0sec


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.67dBm
2.44007GHz
HTC ST20A
BT
MKR
2.44007 GHz
3.67 dBm
START 2.44000GHz
STOP 2.48350GHz
*RBW 30kHz
VBW 30kHz
*SWP 30.0sec

§15.247 9 (a) (1) (iii) - DWELL TIME

Standard Applicable

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

Measurement Procedure

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

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2003-08-01

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

Environmental Conditions

Temperature:	25° C
Relative Humidity:	42%
ATM Pressure:	1025 mbar

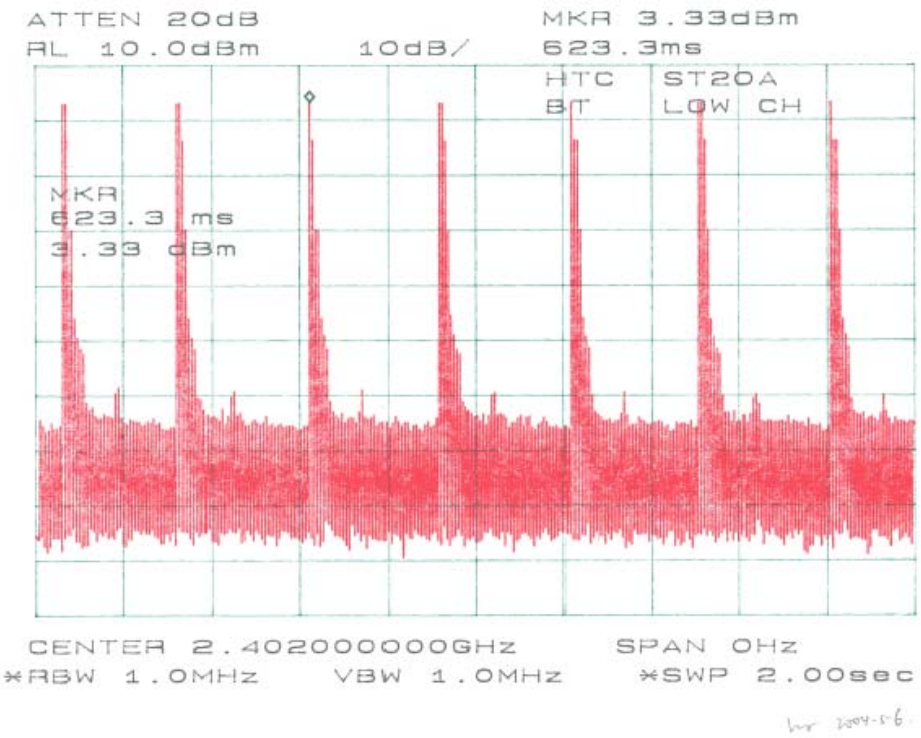
The testing was performed by Ling Zhang on 2004-05-06.

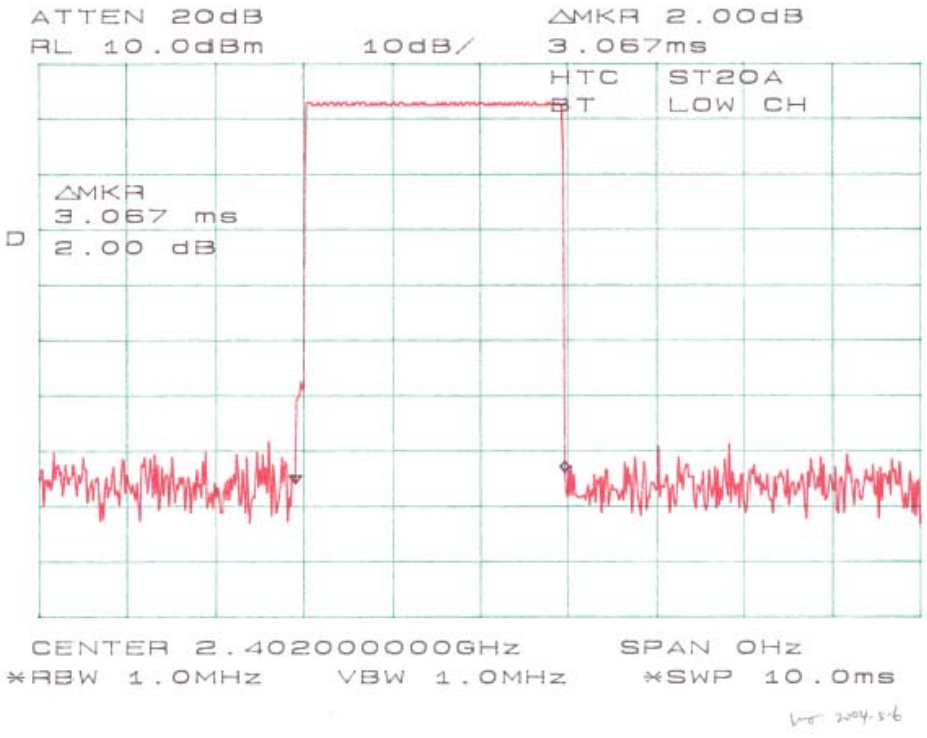
Measurement Results

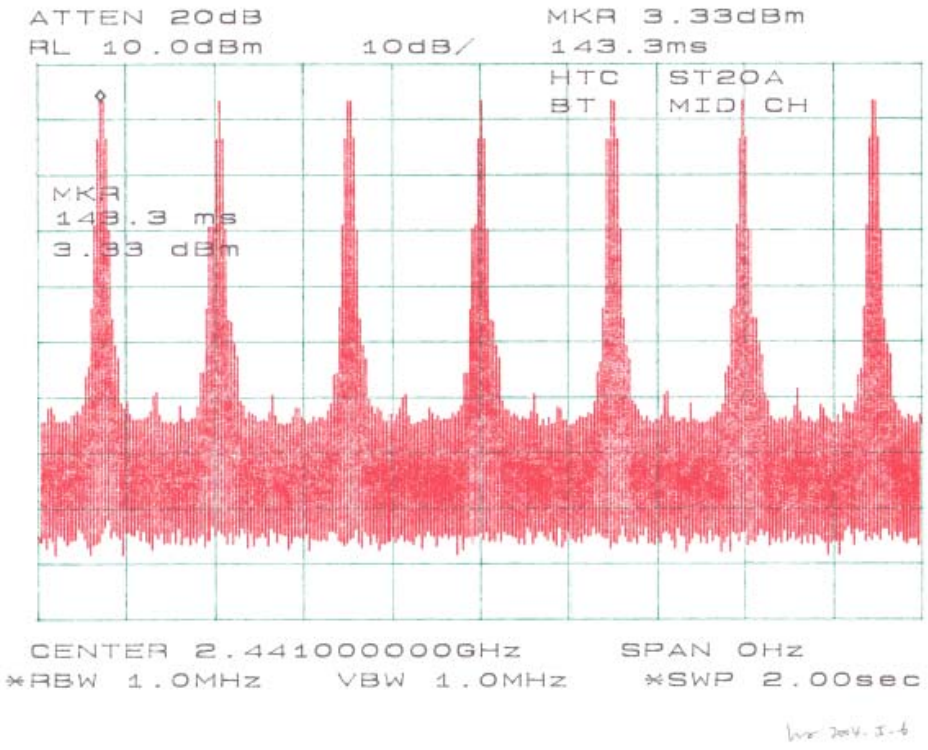
Low Channel: 7 x 3.067(ms) x [(79x0.4) / 2 (s)] = 0.339 s < 0.4 s
Middle Channel: 7 x 3.083(ms) x [(79x0.4) / 2 (s)] = 0.341 s < 0.4 s
High Channel: 7 x 3.067(ms) x [(79x0.4) / 2 (s)] = 0.339 s < 0.4 s

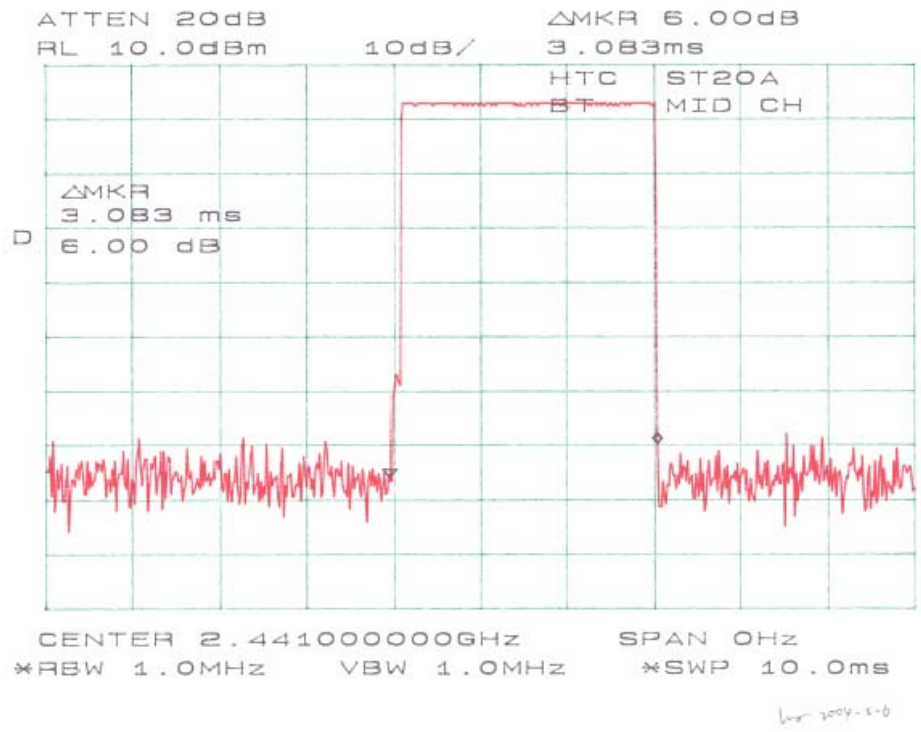
Plots of Dwell Time

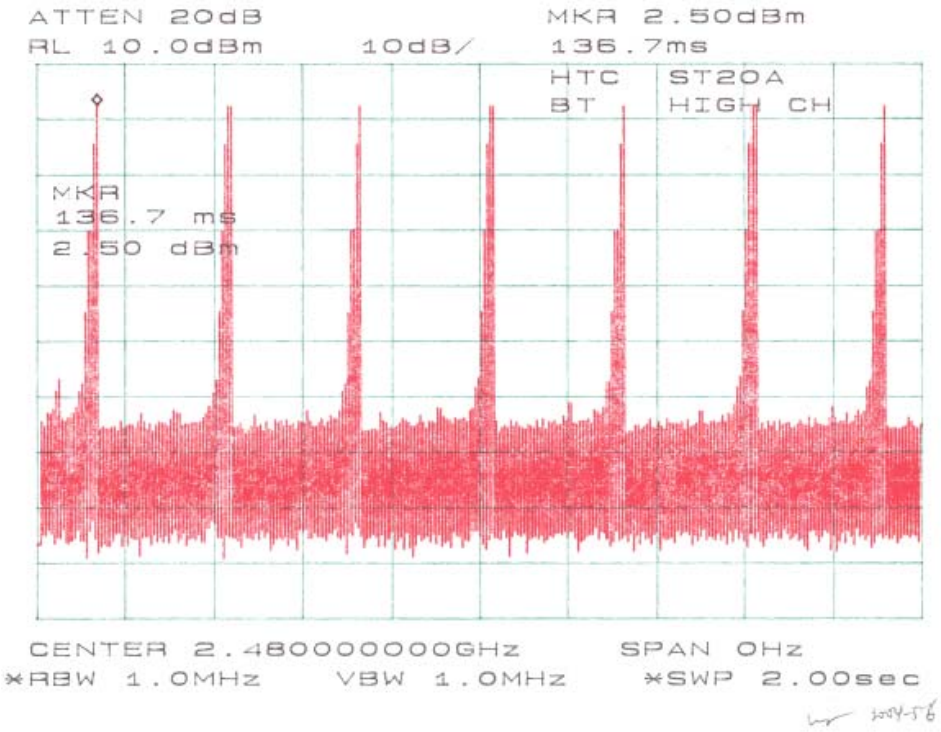
Please refer the following plots.

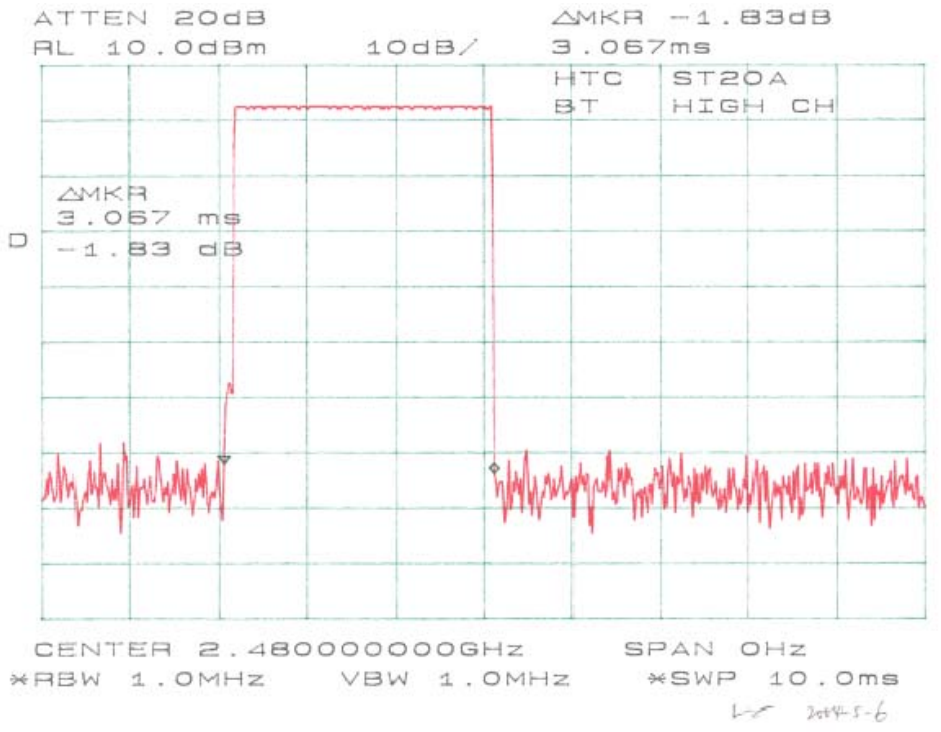

ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.33dBm
623.3ms
HTC ST20A
BT LOW CH
MKR
623.3 ms
3.33 dBm
CENTER 2.402000000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 2.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR 2.00dB
3.067ms
HTC ST20A
BT LOW CH
ΔMKR
3.067 ms
2.00 dB
D
CENTER 2.402000000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 10.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.33dBm
143.3ms
HTC ST20A
BT MID CH
MKR
143.3 ms
3.33 dBm
CENTER 2.441000000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 2.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR 6.00dB
3.083ms
HTC ST20A
BT MID CH
ΔMKR
3.083 ms
D 6.00 dB
CENTER 2.441000000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 10.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 2.50dBm
136.7ms
HTC ST20A
BT HIGH CH
MKR
136.7 ms
2.50 dBm
CENTER 2.480000000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 2.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -1.83dB
3.067ms
HTC ST20A
BT HIGH CH
ΔMKR
3.067 ms
-1.83 dB
D
CENTER 2.480000000GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 10.0ms

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

Standard Applicable

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

Measurement Procedure

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

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2003-08-01

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

Environmental Conditions

Temperature:	23° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

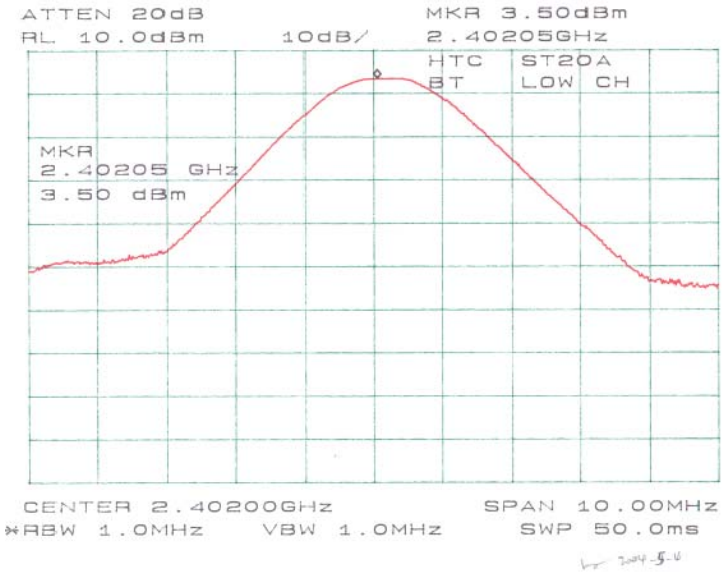
The testing was performed by Ling Zhang on 2004-05-04.

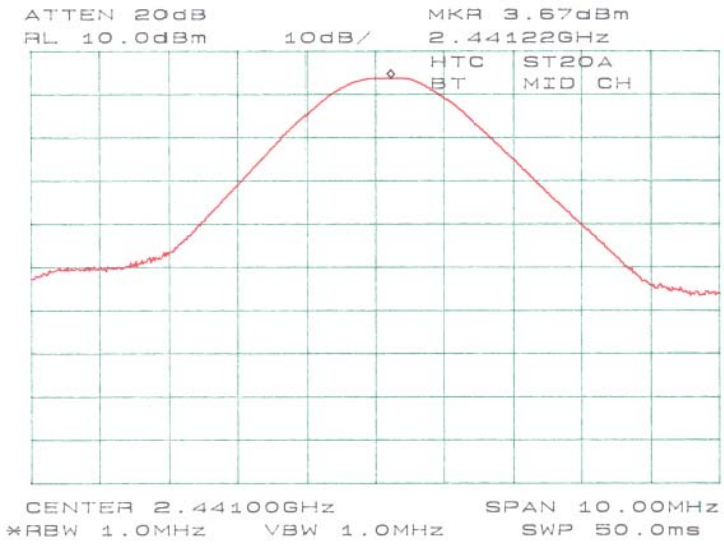
Measurement Result

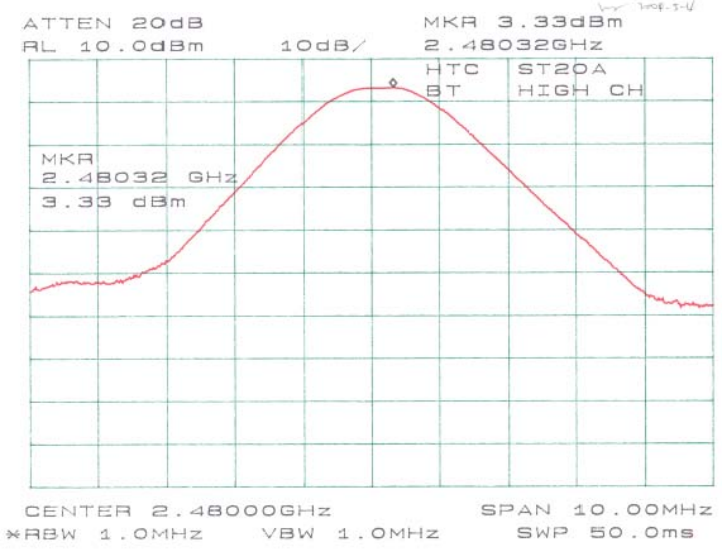
Channel	Frequency	Output Power in dBm	Output Power in W	Standard	Result
Low	2402	3.50	0.00224	≤ 1W	Compliant
Middle	2441	3.67	0.00233	≤ 1W	Compliant
High	2480	3.33	0.00215	≤ 1W	Compliant

Plots of Maximum Peak Output Power

Please refer to following plots.


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.50dBm
2.40205GHz
HTC BT ST20A LOW CH
MKR
2.40205 GHz
3.50 dBm
CENTER 2.40200GHz
SPAN 10.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.67dBm
2.44122GHz
HTC BT ST20A MID CH
CENTER 2.44100GHz
SPAN 10.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.33dBm
2.48032GHz
HTC BT ST20A HIGH CH
MKR
2.48032 GHz
3.33 dBm
CENTER 2.48000GHz
SPAN 10.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

§15.247 (b) (4) - RF EXPOSURE

According to the TCB Exclusions List, the limit for general population of portable transmitters that are used less than 2.5cm from a person's body is :

Low Threshold : ($60/f_{GHz}$) mW, d < 2.5 cm => (60/2.4) = 25mW

The maximum output power for the device is 0.00233W (2.33mW) which is less than the limit lited in the TCB exclusions lists (25mW). Therefore, SAR test is not required for the Part15 portion of this device.

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

Standard Applicable

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

Measurement Procedure

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

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2003-08-01

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

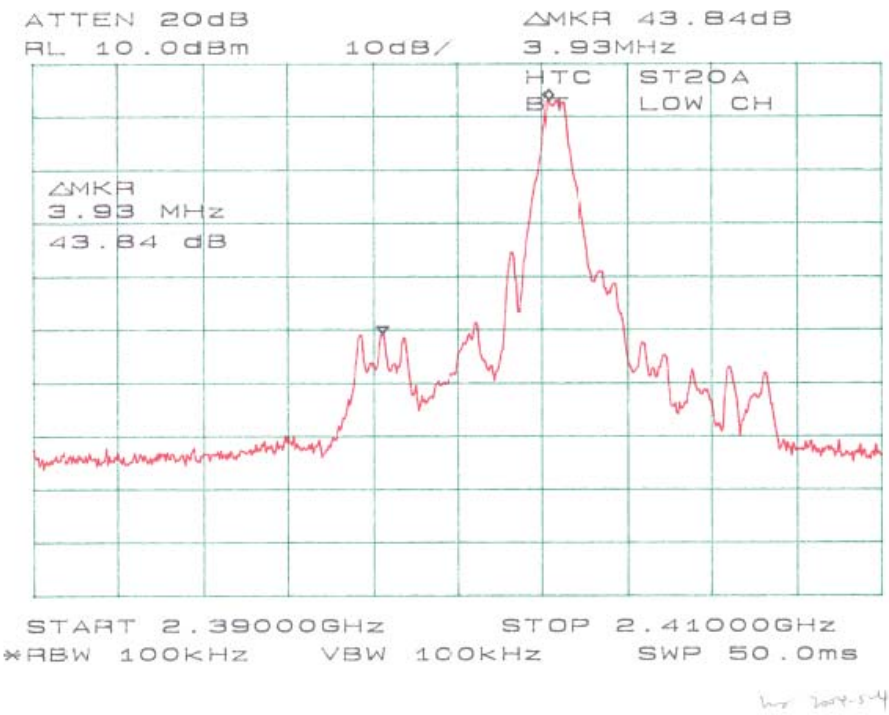
Environmental Conditions

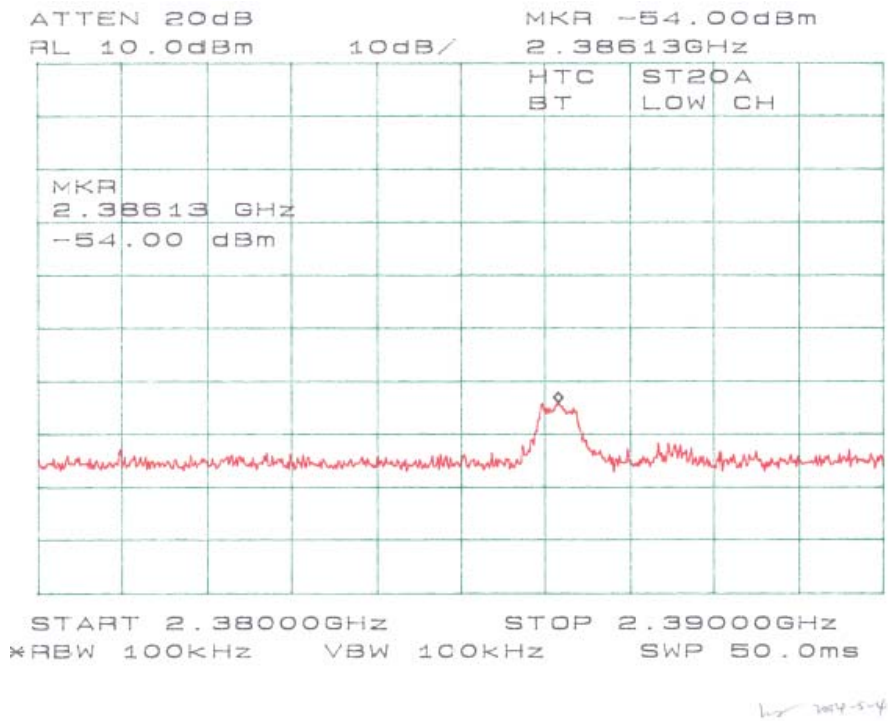
Temperature:	23° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

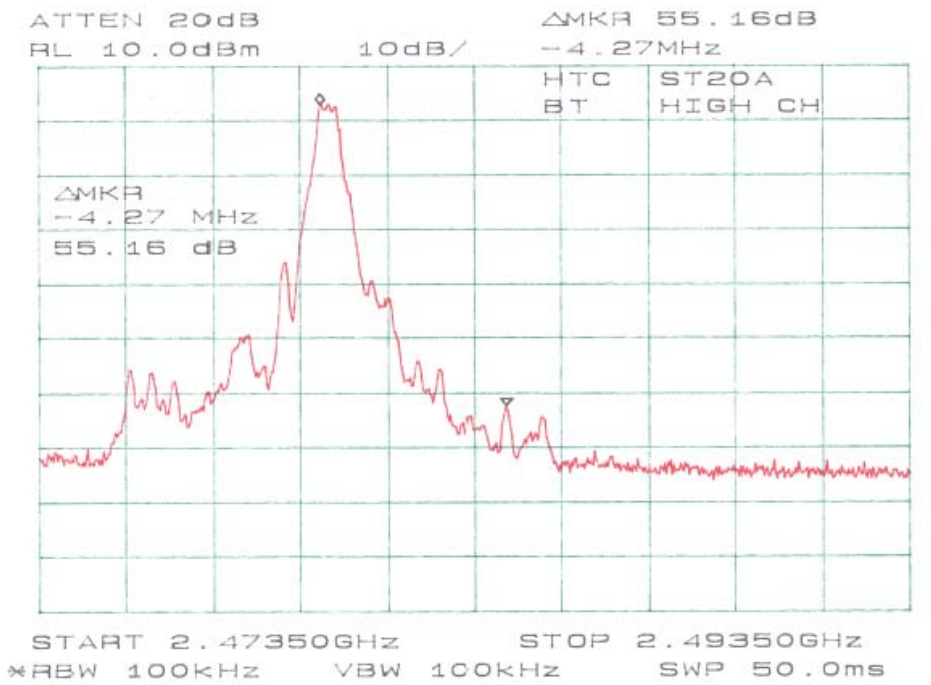
The testing was performed by Ling Zhang on 2004-05-04.

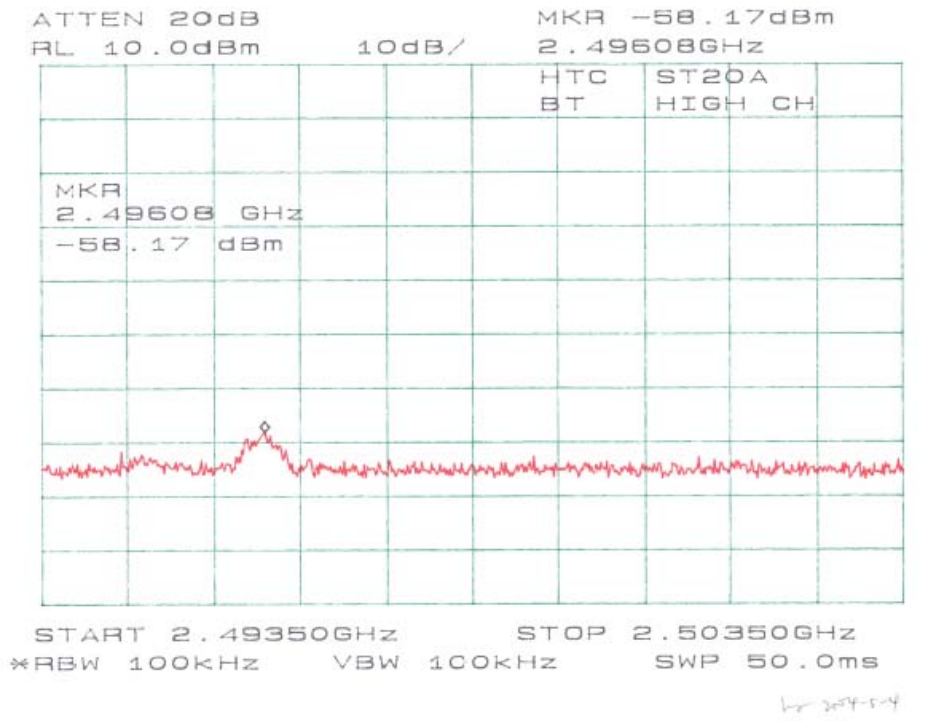
Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR 43.84dB
3.93MHz
HTC ST20A
BT LOW CH
ΔMKR
3.93 MHz
43.84 dB
START 2.39000GHz
STOP 2.41000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -54.00dBm
2.38613GHz
HTC ST20A
BT LOW CH
MKR
2.38613 GHz
-54.00 dBm
START 2.38000GHz
STOP 2.39000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR 55.16dB
-4.27MHz
HTC
BT
ST20A
HIGH CH
ΔMKR
-4.27 MHz
55.16 dB
START 2.47350GHz
STOP 2.49350GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -58.17dBm
2.49608GHz
HTC
BT
ST20A
HIGH CH
MKR
2.49608 GHz
-58.17 dBm
START 2.49350GHz
STOP 2.50350GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

SPURIOUS EMISSION AT ANTENNA PORT

Standard Applicable

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

Measurement Procedure

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

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

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

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

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

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2003-08-01

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

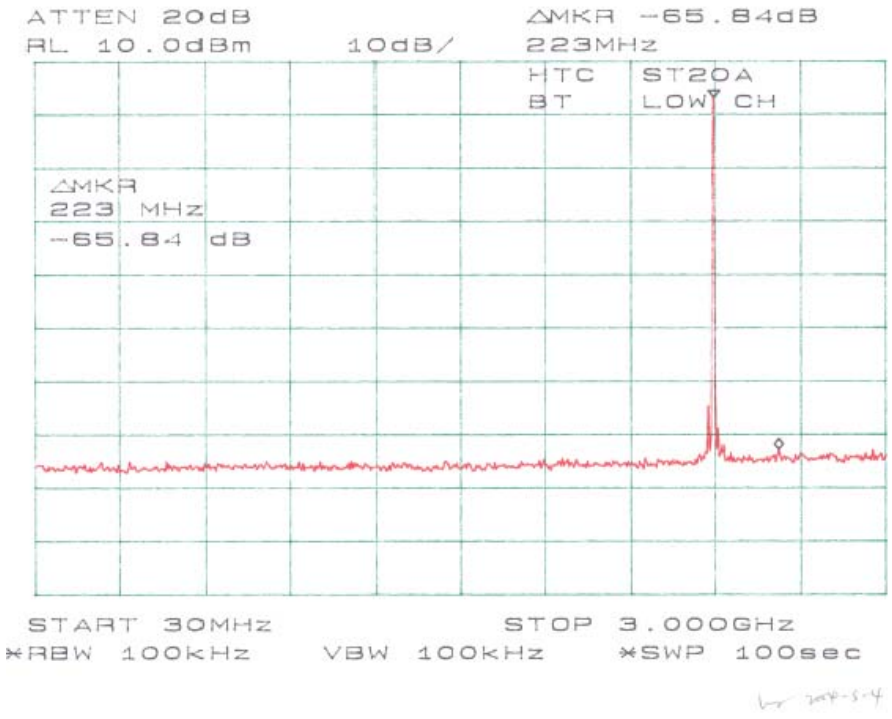
Environmental Conditions

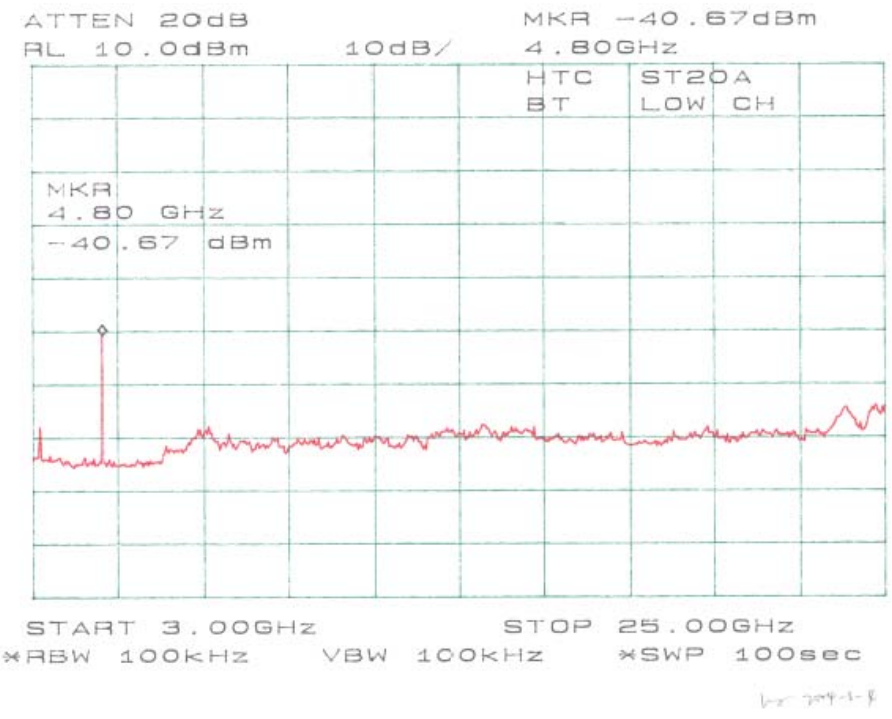
Temperature:	23° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

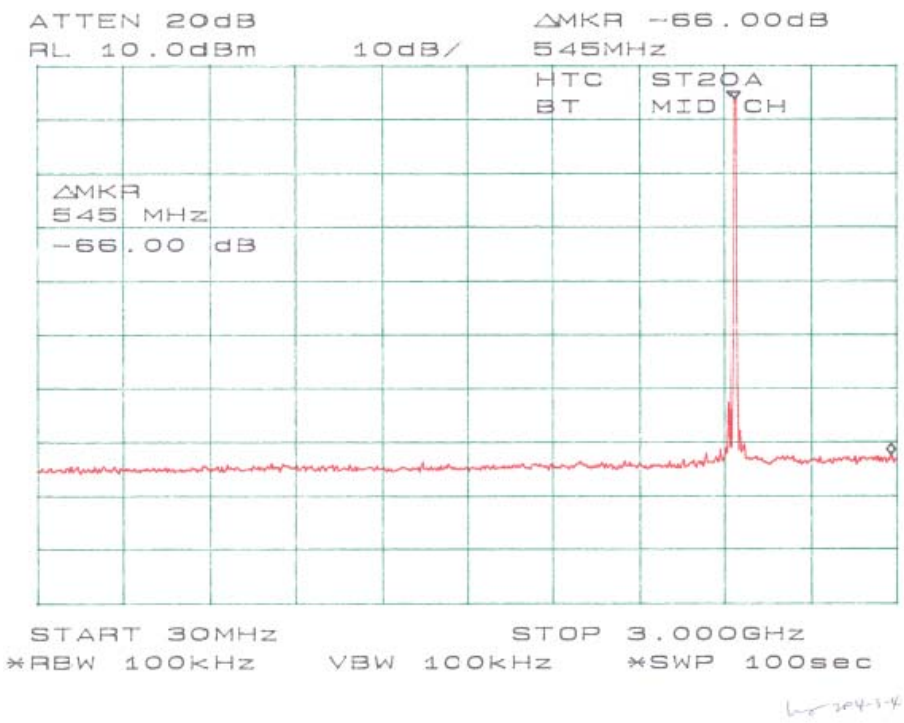
The testing was performed by Ling Zhang on 2004-05-04.

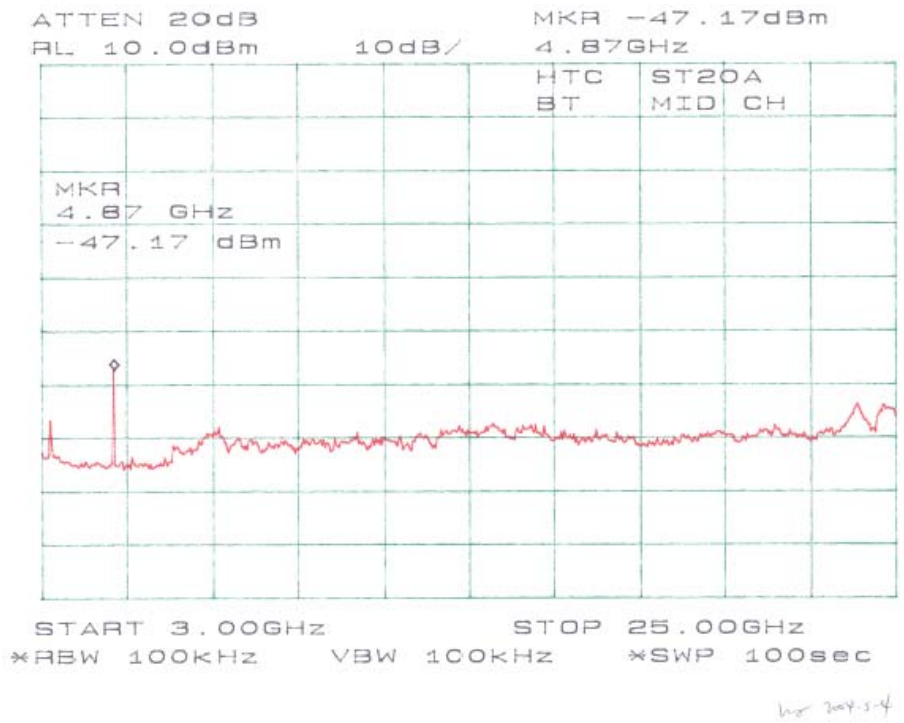
Measurement Results

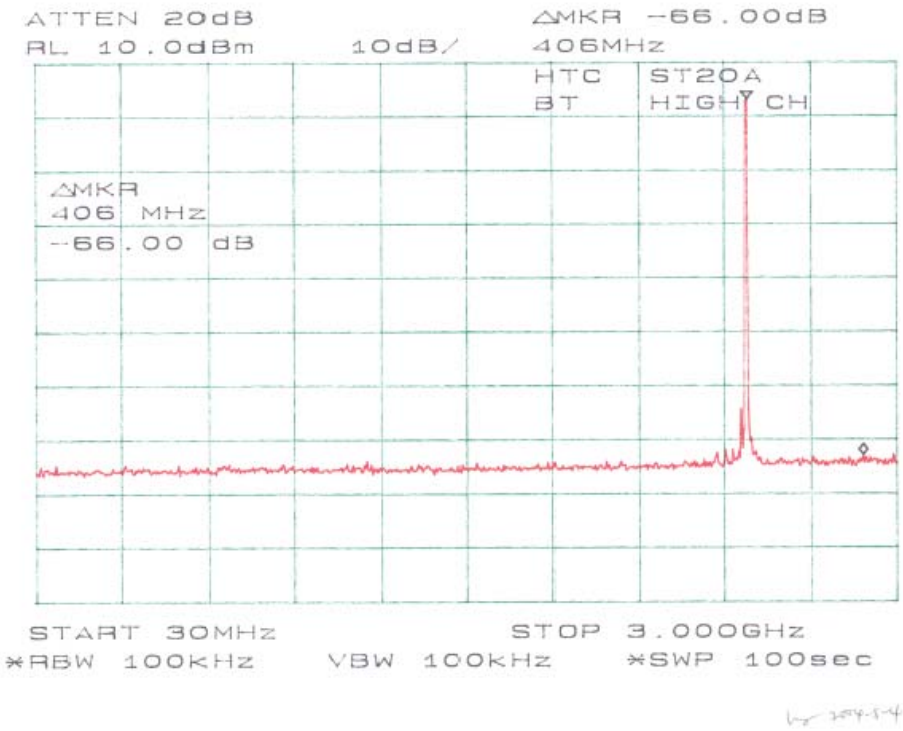
Please refer to the following plots.

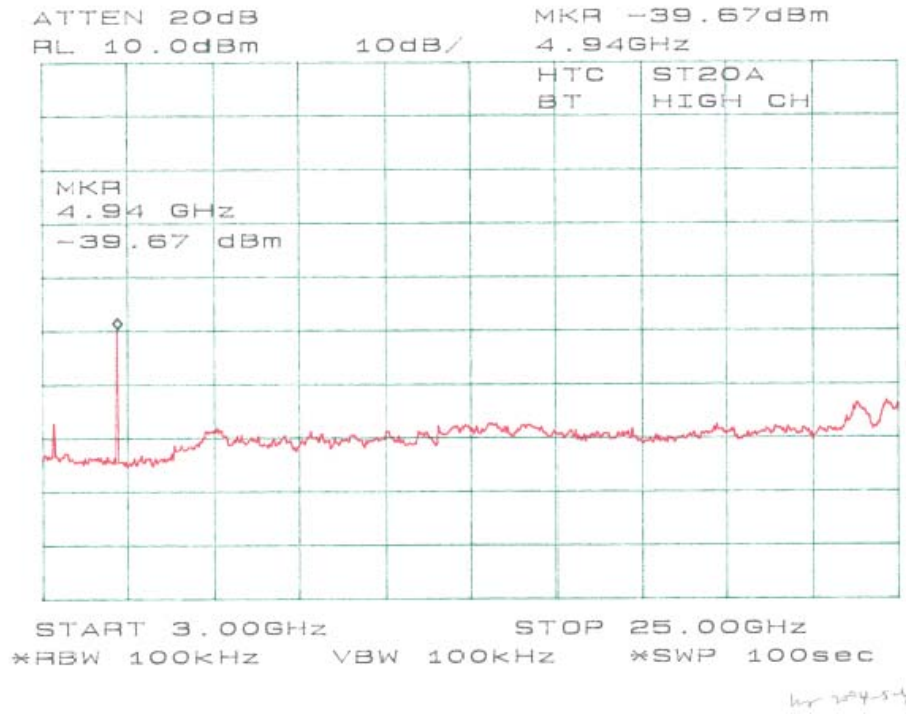

ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -65.84dB
223MHz
HTC ST20A
BT LOW CH
ΔMKR
223 MHz
-65.84 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -40.67dBm
4.80GHz
HTC ST20A
BT LOW CH
MKR
4.80 GHz
-40.67 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -66.00dB
545MHz
HTC BT
ST20A MID CH
ΔMKR
545 MHz
-66.00 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -47.17dBm
4.87GHz
HTC BT
ST20A MID CH
MKR
4.87 GHz
-47.17 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -66.00dB
406MHz
HTC BT
ST20A HIGH CH
ΔMKR
406 MHz
-66.00 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -39.67dBm
4.94GHz
HTC BT
ST20A HIGH CH
MKR
4.94 GHz
-39.67 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 100sec