



FCC PART 15 SUBPART C AND
IC RSS-210 ISSUE 7
MEASUREMENT AND TEST REPORT

For
HeathCo LLC

2901 Industrial Drive, Bowling Green,
KY 42102

**FCC ID: BJ4-67WDB00TX
IC: 3984A-6700TX**

This Report Concerns:		Product Type:
<input checked="" type="checkbox"/> Original Report		Wireless Recessed transmitter
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Report Number:	R0804247	
Report Date:	2008-05-06	
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk “*” (Rev.2)

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1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

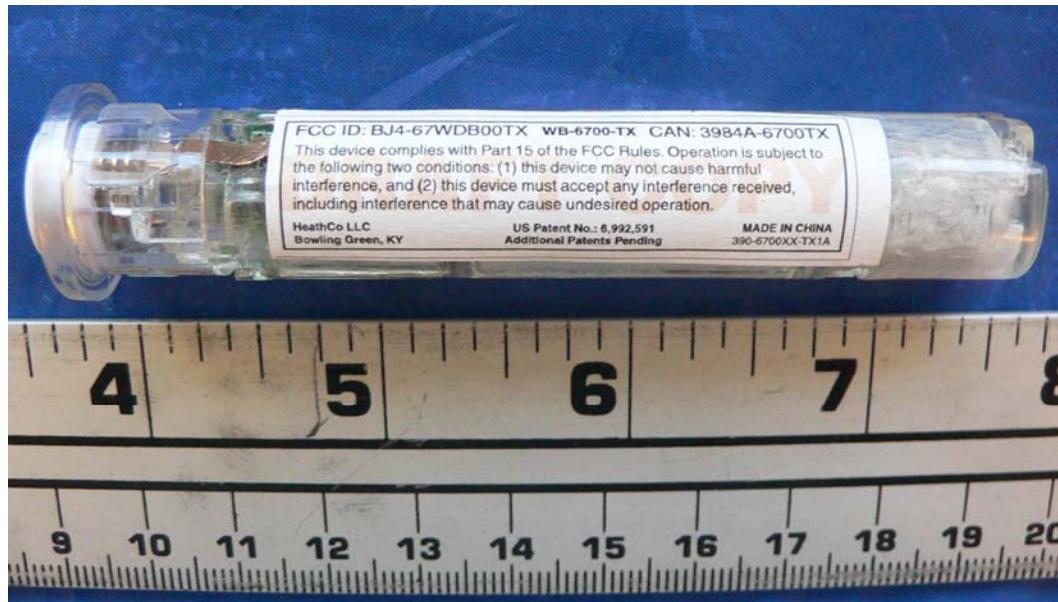
The *HealthCo LLC* product, *FCCID: BJ4-67WDB00TX* or the "EUT" as referred to in this report is an outdoor wireless motion sensor/wireless transmitter. The EUT listed is a door bell push button wireless transmitter in a plastic housing that can transmit to one or more different receivers. One 1.5-volt N-cell battery and a 3 volt DC-DC converter power the transmitter circuit. The miniature dip switches control the coding for the T-99 encoder, allowing up to 128 different code possibilities. The data output of the chip goes to the Transmitter IC circuit which transmits the data using ON/OFF keying. The transmit frequency is 315MHz using a crystal to set the frequency. The encoded signal from the transmitter output is sent to the "helical" antenna mounted in the housing and the RF output is transmitted into the air.

1.2 Mechanical Description

The *HealthCo LLC* product, *FCCID: BJ4-67WDB00TX* in this report is an outdoor wireless motion sensor/ wireless transmitter which measures approximately 92mm (L) x 19mm (W) x 19mm (H) and weighs 14.7 g. The EUT is of plastic construction and designed to operate at 315 MHz frequency.

* The test data gathered are from production sample, serial number: B1789, B1790, assigned by BACL.

1.3 EUT Photo



Additional Photos in Exhibit C

1.4 Objective

This report is prepared on behalf of *HealthCo LLC*. in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules and IC RSS-210 Issue 7, June 2007.

1.5 Related Submittal(s)/Grant(s)

No Related Submittals

1.6 Test Methodology

All measurements contained in this report were conducted 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. All radiated and conducted emissions measurements were performed at BACL.

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 ± 2.0 for Conducted Emissions tests and ± 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.

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 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 have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11, 1997 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003 & TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: R-2463 and C-2698. 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 Corp. 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 EUT was tested in accordance with ANSI C63.4-2003.

2.2 EUT Exercise Software

None, the EUT was exercised in normal operating mode as detailed in the *DESA Specialty* provided instructions.

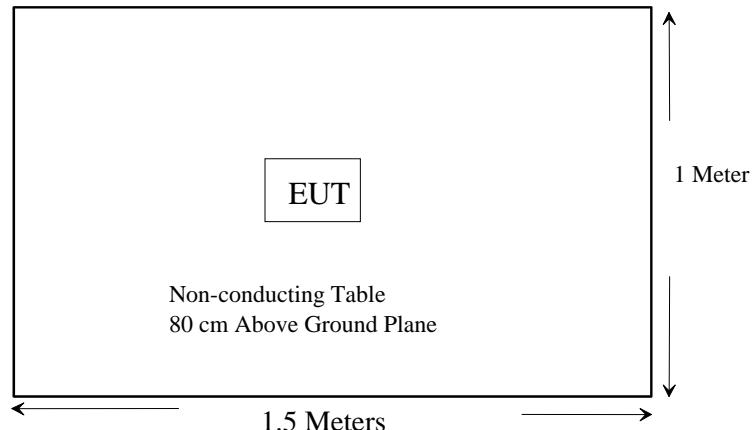
2.3 Special Accessories

None

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Test Setup Block Diagram



3 SUMMARY OF TEST RESULTS

FCC Rules	Requirements	Result
FCC §15.203, IC RSS-Gen §7.1.4	Antenna Requirement	Compliant
§15.205, RSS-210 §2.2	Restricted Bands of Operation	Compliant
§15.207	Conducted Emissions	N/A
§15.209, RSS-210 §2.6	Radiated Emissions, General Requirements	Compliant
§15.231 (a) (1); RSS-210 A1.1.1	5 second manual deactivation	Compliant
§15.231 (a) (2)	5 second automatic deactivation	N/A
§15.231 (a) (3)	Non predetermined transmission intervals. Aggregate Tx <2s/hr.	N/A
§15.231 (a) (4)	Transmissions during an emergency	N/A
§15.231 (a) (5)	15.211 (a)(1) & (a)(2) may be up to 10 seconds during professional installation	N/A
§15.231 (b); RSS-210 A1.1.2	Field strength of emissions	Compliant
§15.231 (b) (1) ; RSS-210 A1.1.2	Field strength limits at 3 meters	Compliant
§15.231 (b) (2); RSS-210 A1.1.2	Field strength; average or QP, 15.35 for averaging pulsed emissions and for limiting peak emissions) or QP detector	Compliant
§15.231 (b) (3); RSS-210 A1.1.2	F/S Limits of spurious emissions	Compliant
§15.231 (c); RSS-210 A1.1.3	Emission B/W	Compliant
§15.231 (d)	40.66–40.70 MHz; Frequency and Voltage Tolerance	N/A
§15.231 (e)	Relaxed restrictions with reduced F/S limits	N/A

4 FCC §15.203, IC RSS-GEN §7.1.4 – ANTENNA REQUIREMENT

4.1 Applicable Standard

According to FCC §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 FCC §15.247 (b) (4), 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.

As per IC RSS-Gen §7.1.4: Transmitter Antenna, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

4.2 Test Result

This product has an integral helical antenna which is soldered on the PCB board, fulfilling the requirement of this section.

Compliant

N/A

5 FCC §15.205, §15.209, RSS-210 §2.6 – RESTRICTED BAND AND RADIATED EMISSION DATA

5.1 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	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
10.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	(2)
13.36–13.41	/	/	/

(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

5.2 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 (microvolt/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

5.3 Applicable Standard: RSS-210 §2.6

Tables 2 and 3 show the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this RSS. Transmitters whose wanted emissions are also within the limits shown in Tables 2 and 3 may operate in any of the frequency bands of Tables 2 and 3, other than the restricted bands of Table 1 and the TV bands, and shall be certified under RSS-210. (Note: Devices operating below 490 kHz all of whose emissions are at least 40 dB below the limit given in Table 3 are Category II devices subject to RSS-310.) Unwanted emissions of transmitters and receivers are permitted to fall into Table 1 and TV frequencies but intentional emissions are prohibited. See the note of Table 2 for further details.

Compliant

N/A

6 FCC §15.231(A) AND RSS-210 A1.1.1 – PERIODIC OPERATION IN THE BAND 40.66 – 40.70 MHZ AND ABOVE 70 MHZ

6.1 Applicable Standard Requirement

(a) The provisions of this Section are restricted to periodic operation within the band 40.66 - 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

RSS-210 A1.1.1

A1.1.1 Types of Momentary Signals

The following conditions shall be met to comply with the provisions for momentary operation:

(a) A manually operated transmitter shall employ a push-to-operate switch and be under manual control at all transmission times. When released, the transmitter shall cease transmission (holdover time of up to 5 seconds is permitted).

Compliant

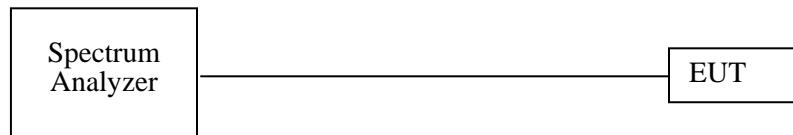
N/A

6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2008-04-28

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

6.3 Test Setup Diagram



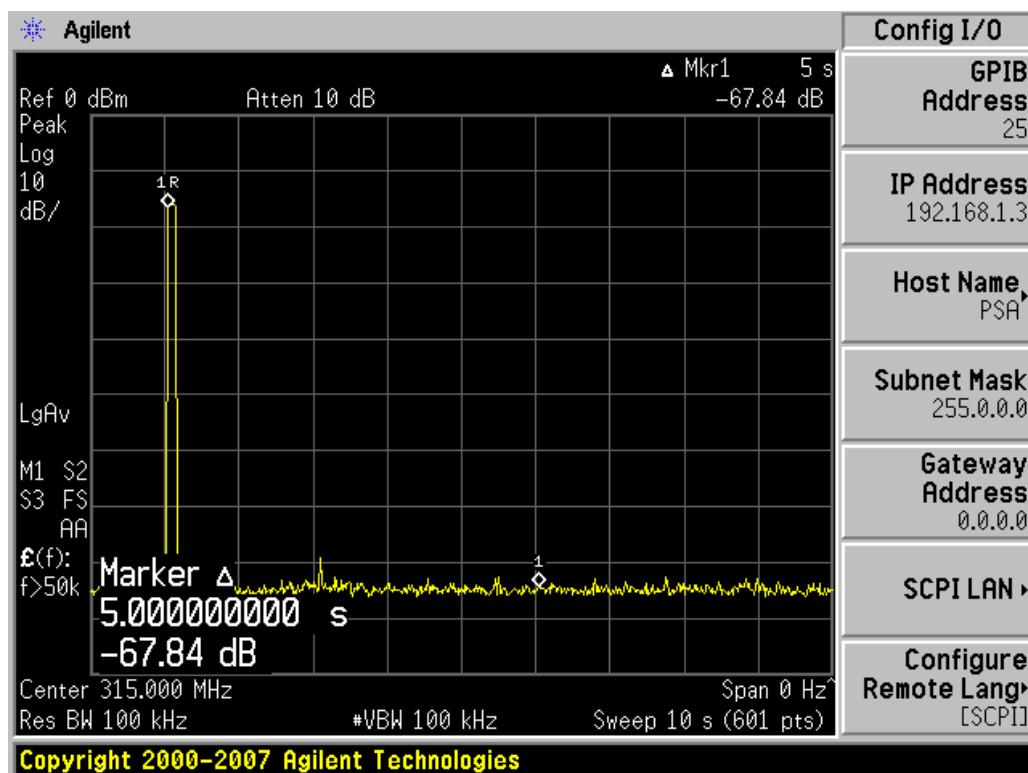
6.4 Environmental Conditions

Temperature:	21 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Victor Zhang on 2008-05-02.

6.5 Test Result

Pass; please refer to the following plot:



7 FCC §15.231(B) AND RSS-210 A1.1.2 – FIELD STRENGTH OF EMISSIONS

7.1 Applicable Standard Requirement

(b): In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750**	125 to 375**
174-260	3,750	375
260-470	3,750 to 12,500**	375 to 1,250**
Above 470	12,500	1,250

**Linear interpolations

Compliant

N/A

b (1): The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

Compliant

N/A

b(2): Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

Compliant

N/A

RSS-210 A1.1.2

A1.1.2 Field Strengths and Frequency Bands

(1) The field strength of emissions from momentarily operated intentional radiators shall not exceed the limits in Table 4.

Table: Permissible Field Strength Limits for Momentarily Operated Devices

Fundamental Frequency (MHz), excluding restricted band frequencies of Table 1	Field Strength of Fundamental ^(Note 1) uV/m @ 3 meters, (Watts, e.i.r.p.)	Field Strength of Unwanted Emissions ^(Note 1) uV/m @ 3 meters
40.66-40.70	See section A2.7	
70-130	1,250 (470 nW)	125
130-174	1,250 to 3,750*	125 to 375
174-260 ^(Note 2)	3,750 (4.2uW)	375
260-470 ^(Note 2)	3,750 to 12,500*	375 to 1,250
Above 470	12,500 (47 uW)	1,250

(2) Intentional radiators shall demonstrate compliance with the limits on the field strength of emissions, as shown in Table 4, based on the average value of the measured emissions. As an alternative, compliance with the limit in Table, may be demonstrated using a CISPR quasi-peak detector. If average emission measurements are employed, the provisions in Section 4.5 (Pulsed Operation) of RSS-Gen for averaging pulsed emissions and for limiting peak emissions apply.

(3) The limits on the field strength of unwanted emissions in Table 4 are based on the fundamental frequency of the intentional radiator. Unwanted emissions shall be attenuated to the limits shown in Table 2 or to the limits shown in Table 4, whichever are less stringent.

Compliant

N/A

7.2 Radiated Emissions EUT Setup

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

The spacing between the peripherals was 10 centimeters.

The EUT was placed on the center of the back edge on the test table.

7.3 Spectrum Analyzer Setup

According to FCC CFR 47, Section 15.33, the EUT was tested to 5GHz.

During the radiated emission test, the CISPR quasi-peak detection was employed:

7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Mini-Circuits	Amplifier, Pre	ZKL-2	7786100643	2008-01-02
IFI	Amplifier, Traveling Wave Tube	ST181-20	E012-0101	2007-06-01
Sunol Sciences	Combination Antenna	JB1 Antenna	A103105-3	2008-03-25
Agilent	Analyzer, Spectrum	8565EC	3946A00131	2008-03-24

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

7.5 Test Procedure

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

According to §15.231, Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emission, based on the average value of the measured emissions. As an alternative, compliance with the limits may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

7.6 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:

$$\text{Corrected Amplitude} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

Corrected For Pulse Operation

When the transmitter is activated (by button press), it will, in the worst case, transmit pulse position modulated (PPM) ASK data.

TX On time Narrow (Ton1) = 355us X 7 = 2.485 ms

TX On time Wide (Ton2) = 685us X 6 = 4.11 ms

Ton = Ton1 + Ton2 = 2.485 ms + 4.11 ms = 6.595 ms

One Pulse Train (Tp) = 23.67 ms

Duty Cycle Factor (dB) = $20 \log [Ton/Tp] = 20 \log [6.595 \text{ ms} / 23.67 \text{ ms}] = -11.1 \text{ dB}$

7.7 Environmental Conditions

Temperature:	21 °C
Relative Humidity:	55 %
ATM Pressure:	100.8 kPa

The testing was performed by Victor Zhang on 2008-04-30.

7.8 Summary of Test Results

According to the data in the following table, the EUT complied with the FCC 15.231(b) and RSS-210 A 1.1.2 standards and had the worst margin reading of:

-1.41 dB at 945 MHz in the **Vertical** polarization.

Radiated Emissions Test Data, 3 meters

Freq. (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Azimuth (Degrees)	Ant. Height (m)	Ant. Polar (V/H)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC 15.231/209	
											Limit (dBuV/m)	Margin (dB)
315.0	89.57	*	100	1.5	V	14.0	11.0	29.25	-11.1	74.22	75.6	-1.38
945.0	59.75	*	0	1.0	V	22.8	12.2	29.45	-11.1	54.19	55.6	-1.41
315.0	89.57	PK	100	1.5	V	14.0	11.0	29.25	0.00	85.32	95.6	-10.28
945.0	59.75	PK	0	1.0	V	22.8	12.2	29.45	0.00	65.29	75.6	-10.31
315.0	78.18	*	220	1.0	H	14.0	11.0	29.25	-11.1	62.83	75.6	-12.77
2520.0	56.22	*	0	1.5	V	29.4	3.8	39.3	-11.1	38.97	55.6	-16.63
1260.0	57.12	*	0	1.0	V	24.6	2.1	35.3	-11.1	37.42	55.6	-18.18
2520.0	54.54	*	0	1.5	H	29.4	3.8	39.3	-11.1	37.29	55.6	-18.31
315.0	78.18	PK	220	1.0	H	14.0	11.0	29.25	0.00	73.93	95.6	-21.67
3150.0	50.14	*	0	1.5	V	30.4	4.5	40.11	-11.1	33.84	55.6	-21.76
3150.0	47.75	*	0	1.5	H	30.4	4.5	40.11	-11.1	31.45	55.6	-24.15
2520.0	56.22	PK	0	1.5	V	29.4	3.8	39.3	0.00	50.07	75.6	-25.53
1260.0	57.12	PK	0	1.0	V	24.6	2.1	35.3	0.00	48.52	75.6	-27.08
2520.0	54.54	PK	0	1.5	H	29.4	3.8	39.3	0.00	48.39	75.6	-27.21
3150.0	50.14	PK	0	1.5	V	30.4	4.5	40.11	0.00	44.94	75.6	-30.66
3150.0	47.75	PK	0	1.5	H	30.4	4.5	40.11	0.00	42.55	75.6	-33.05

Note: (1) For Peak, Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain

(2) For Average, Correction Factor = Duty Cycle (-11.1 dB).

(3) Below 1 GHz, the cable loss includes the 10dB attenuator.

Compliant

N/A

Please refer to the following plots for test result details

Figure a1: The Pulse transmission pattern in 100 ms sweep time.

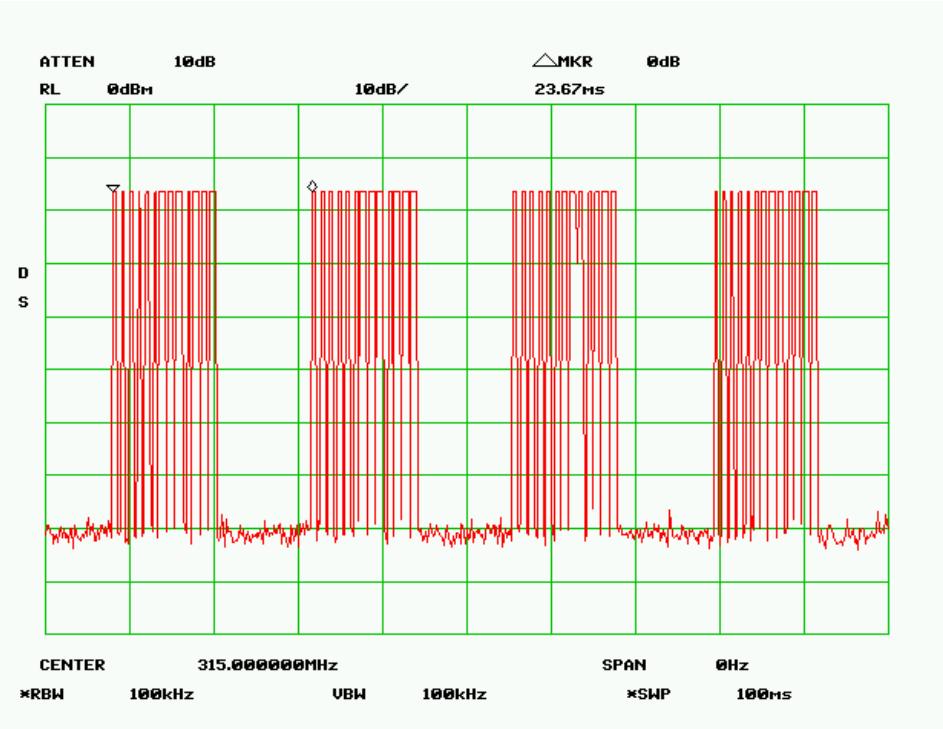


Figure a2: Transmission On Time (7 times – Narrow & 6 times – Wide)

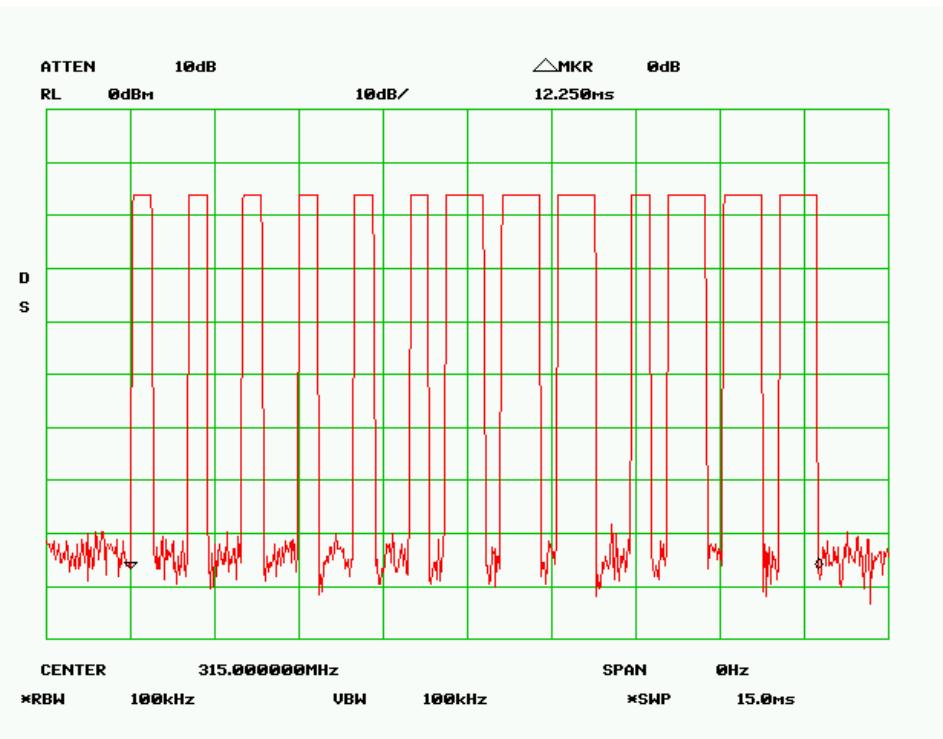
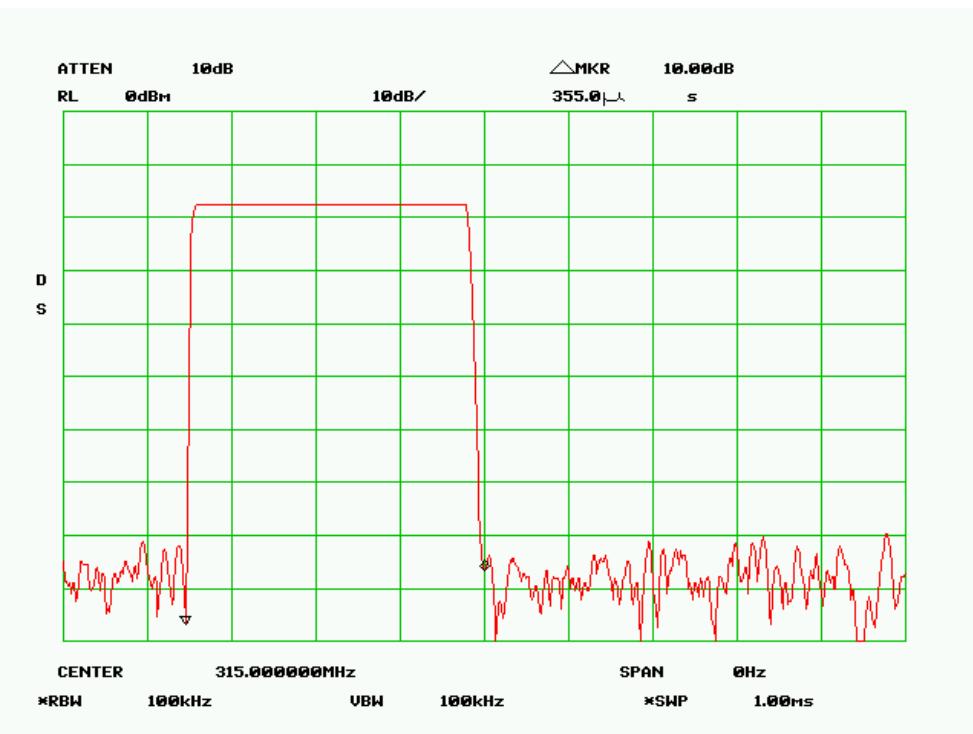
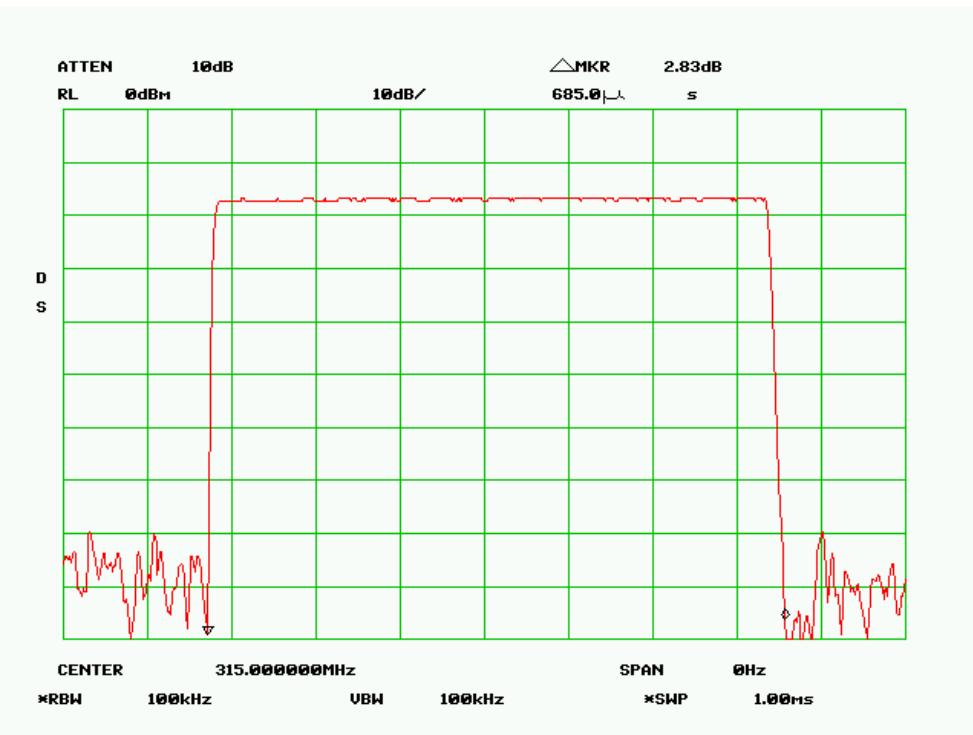


Figure b1: The Pulse width of narrow pulse. Pulse width =0.355 ms**Figure b2: The Pulse width of wide pulse. Pulse width =0.685 ms**

8 FCC §15.231(C) RSS-210 A1.1.3 – EMISSIONS BANDWIDTH, BANDWIDTH OF MOMENTARY SIGNALS

8.1 Applicable Standard Requirement

FCC §15.231(c)

(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RSS-210 A1.1.3

For the purpose of Section A1.1, the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

Compliant

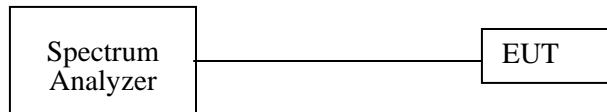
N/A

8.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2008-04-28

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

8.3 Test Setup Diagram



8.4 Environmental Conditions

Temperature:	21 ° C
Relative Humidity:	55%
ATM Pressure:	100.8 kPa

The testing was performed by Victor Zhang on 2008-05-06.

8.5 Test Result

FCC Limit = Fundamental Frequency X 0.25% = $315.00 \text{ MHz} \times 0.25\% = 787.5 \text{ kHz}$

Fund. Frequency (MHz)	20dB Bandwidth Emission (kHz)	FCC Limit (kHz)	Result
315	55.296	787.5	Compliant

IC Limit = Fundamental Frequency X 0.25% = $315.00 \text{ MHz} \times 0.25\% = 787.5 \text{ kHz}$

Fund. Frequency (MHz)	99% Bandwidth Emission (kHz)	IC Limit (kHz)	Result
315	500.4242	787.5	Compliant

Please refer to the following plot for test result details

20 dB & 99% Occupied Bandwidth

