Lab Code: 200167-0

FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

INFINEON TECHNOLOGIES AG

St. Martin Str. 53
Munich, 81541
Germany

FCC ID: Q2331308
Model: Unistone PBA 31308

This Report Concerns:	**Product Type:**
☒ Class II permissive change	Bluetooth EDR module

Test Engineer:	Oscar Au
Report No.:	R0702082-247
Report Date:	2007-02-22
Reviewed By:	VP of Engineering: Hans Mellberg
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DN: CN = Hans, C = US, O = BACL, OU = Engineering
Reason: I am approving this document
Date: 2007.03.02 16:15:13 -08'00'

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1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Infineon Technologies AG*'s product, *FCC ID: Q2331308, Model: Unistone PBA 31308* or the "EUT" as referred to in this report is a 2.4GHz Bluetooth module.

The Bluetooth System module offers a qualified ready-to-use solution for accelerated time-to-market. It is based on Infineon's successful BlueMoon® UniCellular IC, PMB8753. UniStone's Enhanced Data Rate functionality enables wireless multimedia operations, with net data rate up to 2.1 Megabits per second (3.0 Mbit/s modulation).

The UniStone design focus area is cost, audio quality, range and in-design effort. With a temperature range from -40 to +85°C the modules fit's in Consumer as well as in Automotive & Industrial applications. UniStone provides the best radio frequency performance available on the market, providing an outstanding receiver sensitivity of -88 dBm even in Enhanced Data Rate mode. BlueMoon UniCellular includes a high performing adaptive frequency hopping (AFH) algorithm, securing superior performance in environments equipped with WLAN. For co-location with WLAN, BlueMoon UniCellular supports a 3-wire co-existence interface.

1.2 Mechanical Description

The *Infineon Technologies AG*'s product, *FCC ID: Q2331308* measures approximately 12mmL x 9mm W x 2mm H.

** The test data gathered are from a production sample which is provided by the manufacturer, serial number: 0125.*

1.3 EUT Photo

Bluetooth Module

Additional photos in Exhibit C

1.4 Objective

This type approval report is prepared on behalf of *Infineon Technologies A*G in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C of the Federal Communication Commissions rules. Infineon Technologies authorizes Trimble Navigation Limited to perform a FCC Class II Permissive change to the Infineon Bluetooth module PBA 31308.

The objective is to determine continued compliance with FCC 15.247 Standard's limits rules for Antenna Requirements, Conducted Emissions and Radiated Spurious Emissions after the class II permissive change made by *Infineon Technologies A*G.

FCC ID: Q2331308 is electrically identical to the device of the same FCC ID tested by AT4 Wireless in report number: 24838RET.101. The only change that has been made to the EUT is mechanical; two new antennae, Tyco Antenna and Murata Antenna with a maximum gain of 4 dBi and 0 dBi respectively have been added to the EUT. Please refer to Trimble Navigation Limited Description letter filed along with this submission.

1.5 Related Submittal(s)/Grant(s)

This is a Permissive Change II application. The original application was granted on 2007-01-12 by MET Laboratories, Inc.

1.6 Test Methodology

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

1.7 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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 ranging from $\pm$2.0 dB 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 Corp.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. 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 configured for testing according to ANSI C63.4-2003.

The EUT was built in two different Trimble support boards with Tyco antenna and Murata antenna installed respectively and tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

2.2 Special Accessories

As shown in following test block diagram.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Local Support Equipment List and Details

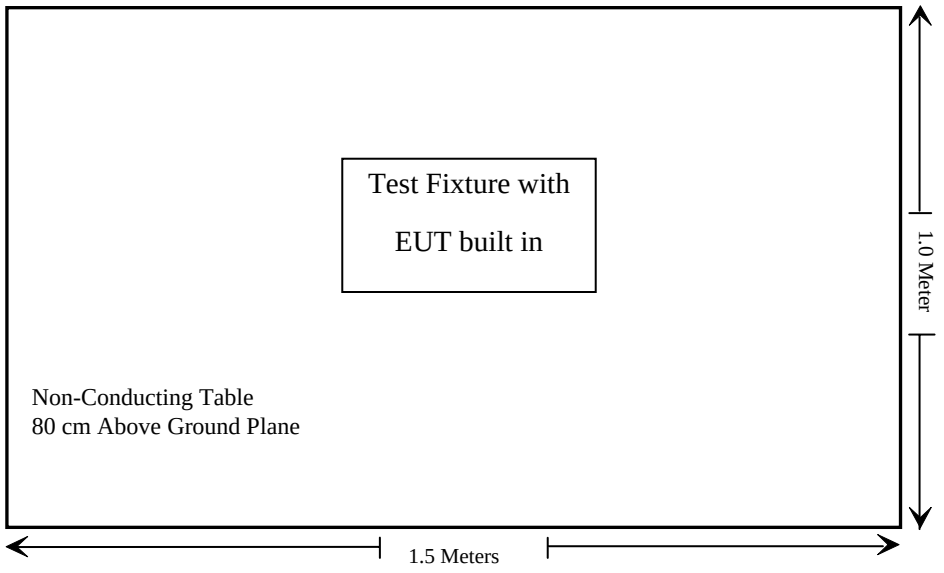
Manufacturer	Description	Model	Serial Number
Dell	Laptop PC	Latitude D620	35990178337

2.5 Power Supply Information

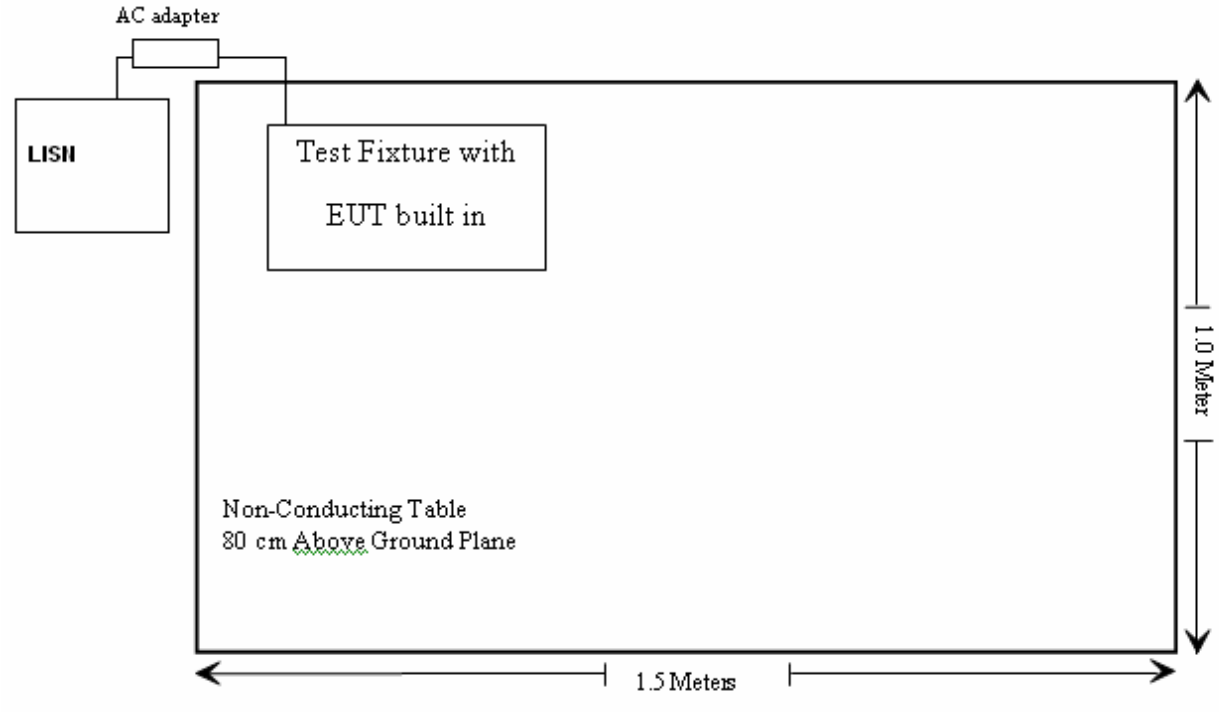
Manufacturer	Description	Model	Serial Number
Friwo	AC-DC Adapter	SDA5518	901.0003.000

2.6 Test Setup Block Diagram

2.6.1 Radiated Emissions



2.6.2 Conducted Emissions



3 SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1091, §15.247(f)	RF Exposure Requirement	Compliant
§15.203 §15.247(b)(4)	Antenna Requirement	Compliant
§ 15.207 (a)	Conducted Emissions	Compliant
§2.1051 & §15.247(d)	Spurious Emissions at Antenna Port	Please refer to original report
§15.205, §15.209(a), §15.247(d)	Spurious Radiated Emissions	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Please refer to original report
§15.247 (a) (1)	Channel Bandwidth	Please refer to original report
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Please refer to original report
§15.247 (a) (1) (iii)	Dwell Time of Each Frequency	Please refer to original report
§15.247 (b)(3)	Maximum Peak Output Power	Please refer to original report
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Please refer to original report

4 §15.203 - ANTENNA REQUIREMENT

4.1 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.

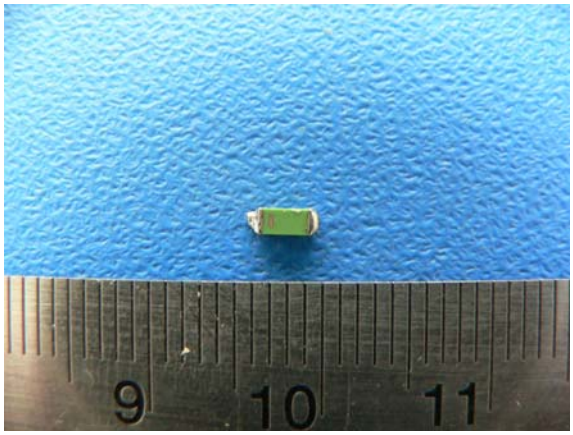
And according to § 15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Result

The antennae for this device are internal antennae and a chip multilayer antenna connected to the main board in a fashion not readily accessible to the end user with a maximum gain of 4 dBi and 0 dBi which is under the 6 dBi limit.

Compliant. Please refer to the following antenna photos for details.

4 dBi (Tyco internal antenna)



0 dBi (Murata chip multilayer antenna)

5 §15.205, §15.209(a) & §15.247(d) - RADIATED EMISSIONS

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

5.2 Test Setup

The radiated emissions tests were performed in the 5-meter shielded room, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

The module was built in two different Trimble support boards with Tyco antenna and Murata antenna installed respectively.

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.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sonoma	Amplifier, Pre	317	260407	2006-03-20
Sunol Science	30MHz ~ 2 GHz Antenna	JB1	A03105-3	2006-03-15
A.R.A	Antenna, Horn, DRG	DRG-118/A	1132	2005-08-17*
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	2006-08-21

***** *two year calibration cycle*

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

5.4 Environmental Conditions

Temperature:	20-22° C
Relative Humidity:	40-50%
ATM Pressure:	1012-1014 mbar

**The testing was performed by Oscar Au on 2007-02-12 to 2007-02-14.*

5.5 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

5.6 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 emissions are 7dB below the maximum limit . The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

5.7 Summary of Test Results

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

Tyco Antenna

-18.3 dB at **7206.0000 MHz** in the **Horizontal** polarization, 1GHz – 25GHz**, Low Channel**

-14.6 dB at **4882.0000 MHz** in the **Vertical** polarization, 1GHz – 25GHz**, Middle Channel**

-12.3 dB at **4960.0000 MHz** in the **Horizontal** polarization, 1GHz – 25GHz**, High Channel**

Murata Antenna

-23.7 dB at **4804.0000 MHz** in the **Vertical** polarization, 1GHz – 25GHz**, Low Channel**

-23.4 dB at **4882.0000 MHz** in the **Vertical** polarization, 1GHz – 25GHz**, Middle Channel**

-22.3 dB at **4960.0000 MHz** in the **Vertical** polarization, 1GHz – 25GHz**, High Channel**

Module with Murata Antenna

1GHz – 25GHz

Low Channel: 2402 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Height (Meter)	Polar. (H / V)	Antenna Factor (dB/m)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247 Limit (dBµV/m)	15.247 Margin	Comments
2402.0000	90.8	220	1.4	V	28.7	2.7	35.8	86.3	-	-	Fund/Peak
2402.0000	86.0	40	1.4	H	28.7	2.7	35.8	81.5	-	-	Fund/Peak
2402.0000	90.6	220	1.4	V	28.7	2.7	35.8	86.1	-	-	Ave
2402.0000	85.9	40	1.4	H	28.7	2.7	35.8	81.4	-	-	Ave
4804.0000	28.8	220	1.3	V	32.5	3.8	34.8	30.3	54	-23.7	Ave
4804.0000	28.2	300	1.2	H	32.5	3.8	34.8	29.7	54	-24.3	Ave
4804.0000	41.5	220	1.3	V	32.5	3.8	34.8	43.0	74	-31.0	Peak
4804.0000	40.3	300	1.2	H	32.5	3.8	34.8	41.8	74	-32.2	Peak

Middle Channel: 2441 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Height (Meter)	Polar. (H / V)	Antenna Factor (dB/m)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247 Limit (dBµV/m)	15.247 Margin	Comments
2441.0000	90.5	220	1.2	V	28.7	2.7	35.8	86.0	-	-	Fund/Peak
2441.0000	87.4	270	1.3	H	28.7	2.7	35.8	82.9	-	-	Fund/Peak
2441.0000	90.3	220	1.2	V	28.7	2.7	35.8	85.8	-	-	Ave
2441.0000	87.3	270	1.3	H	28.7	2.7	35.8	82.8	-	-	Ave
4882.0000	29.0	210	1.0	V	32.5	3.9	34.8	30.6	54	-23.4	Ave
4882.0000	28.0	320	1.3	H	32.5	3.9	34.8	29.6	54	-24.4	Ave
4882.0000	41.3	210	1.0	V	32.5	3.9	34.8	42.9	74	-31.1	Peak
4882.0000	40.5	320	1.3	H	32.5	3.9	34.8	42.1	74	-31.9	Peak

High Channel: 2480 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Height (Meter)	Polar. (H / V)	Antenna Factor (dB/m)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247 Limit (dBµV/m)	15.247 Margin	Comments
2480.0000	88.5	300	1.2	V	28.7	2.7	35.8	84.0	-	-	Fund/Peak
2480.0000	88.3	220	1.0	H	28.7	2.7	35.8	83.8	-	-	Fund/Peak
2480.0000	88.4	300	1.2	V	28.7	2.7	35.8	83.9	-	-	Ave
2480.0000	88.1	220	1.0	H	28.7	2.7	35.8	83.6	-	-	Ave
4960.0000	30.3	55	1.2	V	32.5	3.9	35.0	31.7	54	-22.3	Ave
4960.0000	28.1	340	1.2	H	32.5	3.9	35.0	29.5	54	-24.5	Ave
4960.0000	42.3	55	1.2	V	32.5	3.9	35.0	43.7	74	-30.3	Peak
4960.0000	41.2	340	1.2	H	32.5	3.9	35.0	42.6	74	-31.4	Peak

Module with Tyco Antenna

1GHz – 25GHz

Low Channel: 2402 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Height (Meter)	Polar. (H / V)	Antenna Factor (dB/m)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247 Limit (dBµV/m)	15.247 Margin	Comments
2402.0000	93.2	60	1.5	V	28.7	2.7	35.8	88.7	-	-	Fund/Peak
2402.0000	92.5	300	1.5	H	28.7	2.7	35.8	88.0	-	-	Fund/Peak
2402.0000	93.2	60	1.5	V	28.7	2.7	35.8	88.7	-	-	Ave
2402.0000	92.4	300	1.5	H	28.7	2.7	35.8	87.9	-	-	Ave
7206.0000	29.2	180	1.4	V	36.7	4.7	34.9	35.7	54	-18.3	Ave
7206.0000	28.4	150	1.6	H	36.7	4.7	34.9	34.9	54	-19.1	Ave
9608.0000	27.9	60	1.5	V	38.1	5.5	36.9	34.6	54	-19.4	Ave
4804.0000	33.0	90	1.7	H	32.5	3.8	34.8	34.5	54	-19.5	Ave
9608.0000	27.8	240	1.7	H	38.1	5.5	36.9	34.5	54	-19.5	Ave
4804.0000	32.8	20	1.7	V	32.5	3.8	34.8	34.3	54	-19.7	Ave
9608.0000	41.4	60	1.5	V	38.1	5.5	36.9	48.1	74	-25.9	Peak
9608.0000	41.3	240	1.7	H	38.1	5.5	36.9	48.0	74	-26.0	Peak
7206.0000	41.0	180	1.4	V	36.7	4.7	34.9	47.5	74	-26.5	Peak
7206.0000	40.5	150	1.6	H	36.7	4.7	34.9	47.0	74	-27.0	Peak
4804.0000	38.5	90	1.7	H	32.5	3.8	34.8	40.0	74	-34.0	Peak
4804.0000	38.1	20	1.7	V	32.5	3.8	34.8	39.6	74	-34.4	Peak

Middle Channel: 2441 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Height (Meter)	Polar. (H / V)	Antenna Factor (dB/m)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247 Limit (dBµV/m)	15.247 Margin	Comments
2441.0000	96.7	40	1.8	V	28.7	2.7	35.8	92.2	-	-	Fund/Peak
2441.0000	96.5	290	1.8	H	28.7	2.7	35.8	92.0	-	-	Fund/Peak
2441.0000	96.6	40	1.8	V	28.7	2.7	35.8	92.1	-	-	Ave
2441.0000	96.4	290	1.8	H	28.7	2.7	35.8	91.9	-	-	Ave
4882.0000	37.8	340	1.6	V	32.5	3.9	34.8	39.4	54	-14.6	Ave
4882.0000	34.5	300	1.5	H	32.5	3.9	34.8	36.1	54	-17.9	Ave
9764.0000	27.6	150	1.8	H	38.1	5.5	36.7	34.6	54	-19.4	Ave
7323.0000	28.1	250	1.9	V	36.7	4.8	35.1	34.5	54	-19.5	Ave
9764.0000	27.4	200	1.6	V	38.1	5.5	36.7	34.4	54	-19.6	Ave
7323.0000	27.8	150	1.8	H	36.7	4.8	35.1	34.2	54	-19.8	Ave
7323.0000	41.2	250	1.9	V	36.7	4.8	35.1	47.6	74	-26.4	Peak
9764.0000	40.5	200	1.6	V	38.1	5.5	36.7	47.5	74	-26.5	Peak
7323.0000	41.0	150	1.8	H	36.7	4.8	35.1	47.4	74	-26.6	Peak
9764.0000	40.2	150	1.8	H	38.1	5.5	36.7	47.2	74	-26.8	Peak
4882.0000	42.2	340	1.6	V	32.5	3.9	34.8	43.8	74	-30.2	Peak
4882.0000	41.1	300	1.5	H	32.5	3.9	34.8	42.7	74	-31.3	Peak

High Channel: 2480 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Height (Meter)	Polar. (H / V)	Antenna Factor (dB/m)	Cable loss (dB)	Amplifier (dB)	Corrected Reading (dBµV/m)	15.247 Limit (dBµV/m)	15.247 Margin	Comments
2480.0000	94.9	60	1.7	V	28.7	2.7	35.8	90.4	-	-	Fund/Peak
2480.0000	96.7	290	1.8	H	28.7	2.7	35.8	92.2	-	-	Fund/Peak
2480.0000	94.8	60	1.7	V	28.7	2.7	35.8	90.3	-	-	Ave
2480.0000	96.6	290	1.8	H	28.7	2.7	35.8	92.1	-	-	Ave
4960.0000	40.3	320	1.4	H	32.5	3.9	35.0	41.7	54	-12.3	Ave
4960.0000	39.9	45	1.4	V	32.5	3.9	35.0	41.3	54	-12.7	Ave
9920.0000	28.7	95	2.0	H	38.1	5.6	36.4	36.0	54	-18.0	Ave
9920.0000	28.6	320	1.6	V	38.1	5.6	36.4	35.9	54	-18.1	Ave
7440.0000	28.6	180	1.9	V	36.7	4.8	35.6	34.4	54	-19.6	Ave
7440.0000	28.1	200	1.7	H	36.7	4.8	35.6	33.9	54	-20.1	Ave
9920.0000	41.0	95	2.0	H	38.1	5.6	36.4	48.3	74	-25.7	Peak
9920.0000	40.8	320	1.6	V	38.1	5.6	36.4	48.1	74	-25.9	Peak
7440.0000	41.5	180	1.9	V	36.7	4.8	35.6	47.3	74	-26.7	Peak
7440.0000	40.8	200	1.7	H	36.7	4.8	35.6	46.6	74	-27.4	Peak
4960.0000	43.6	320	1.4	H	32.5	3.9	35.0	45.0	74	-29.0	Peak
4960.0000	42.6	45	1.4	V	32.5	3.9	35.0	44.0	74	-30.0	Peak

6 §15.207(a) - CONDUCTED EMISSIONS

6.1 Section 15.207 Conducted limits:

6.2 Applicable Standard

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

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	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.*

6.3 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.

The module was built in two different Trimble support boards with Tyco antenna and Murata antenna installed respectively, and the Trimble support board was connect to LISN-1.

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

6.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Artificial-Mains Network	ESH2-Z5	871884/039	2006-11-14
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2006-03-13

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

6.5 Test Procedure

During the conducted emissions test, the AC-DC adapter that powered the Trimble board was connected to the mains 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".

6.6 Environmental Conditions

Temperature:	20° C
Relative Humidity:	35%
ATM Pressure:	1011mbar

**The testing was performed by Oscar Au from 2007-02-12*

6.7 Summary of Test Results

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:

Tyco antenna

-19.0 dB at 0.81231MHz **Neutral** conductor

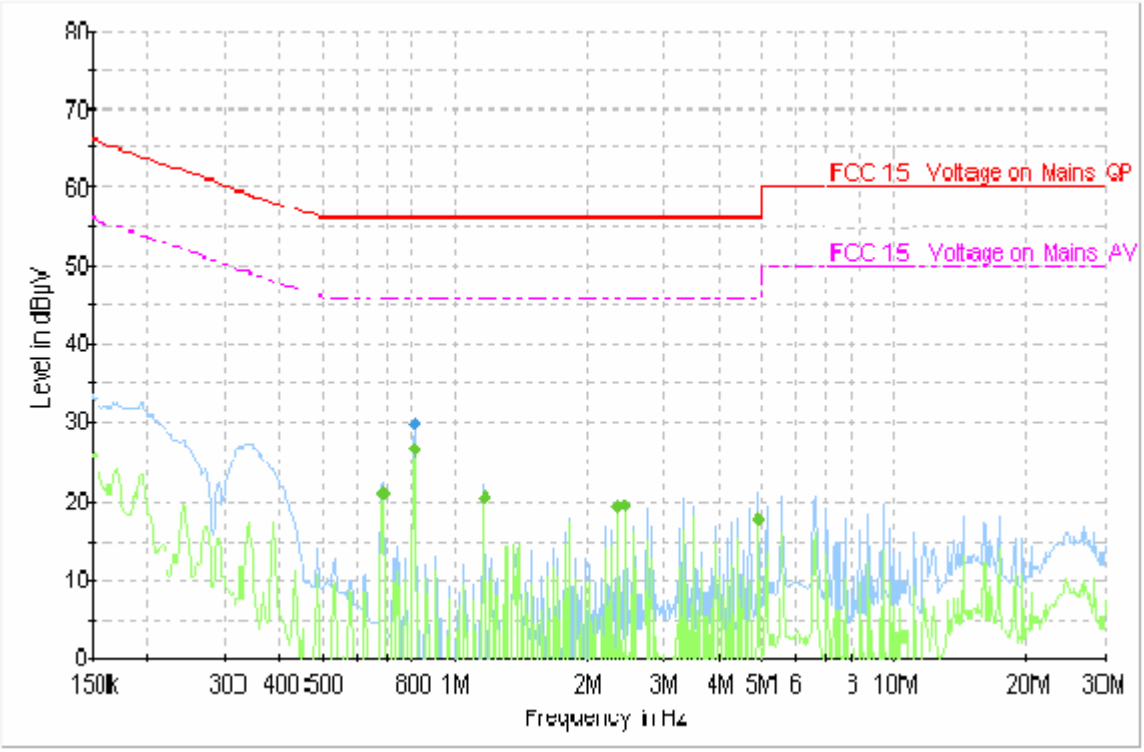
Murata antenna

-15.1 dB at 0.38409MHz **Neutral** conductor

6.8 Conducted Emissions Test Plots and Data

6.8.1 Tyco Antenna

120V/ 60 Hz Line:



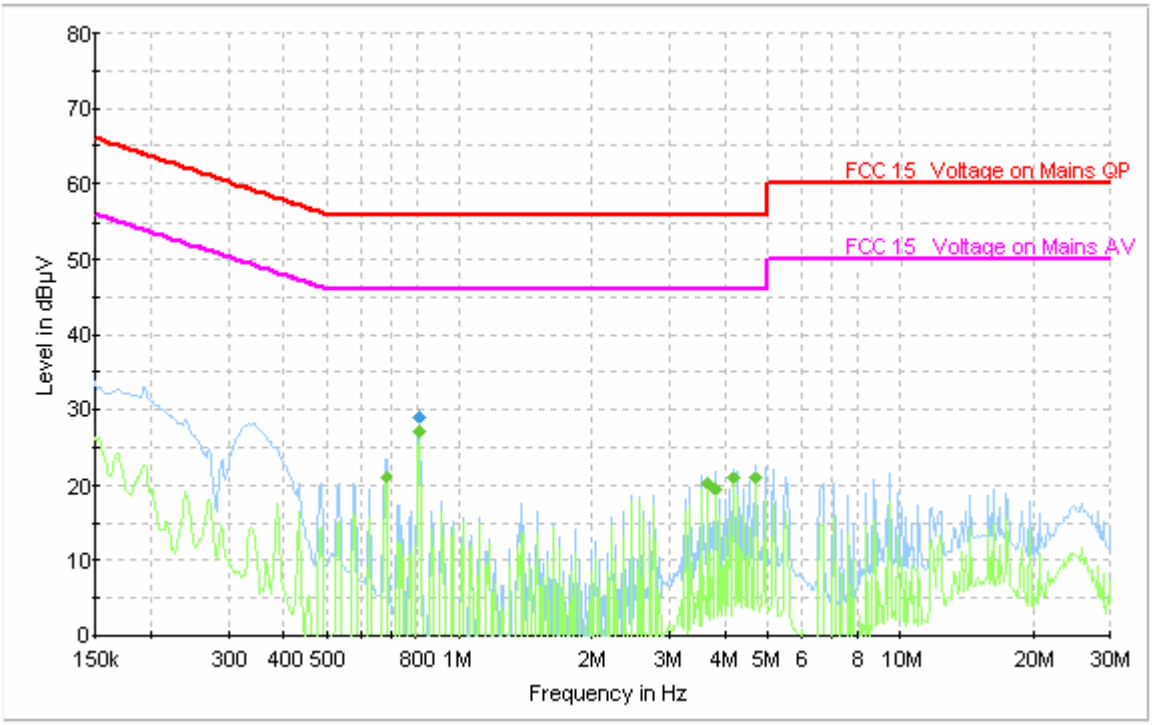
Quasi-Peak Measurement

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.812310	30.0	L	56.0	-26.1

Average Measurement

Frequency (MHz)	Average (dBµV)	Line (L/N)	Limit (dBµV)	Margin (dB)
0.812310	26.7	L	46.0	-19.3
0.681700	21.2	L	46.0	-24.8
1.171950	20.5	L	46.0	-25.5
2.458880	19.6	L	46.0	-26.4
2.362850	19.3	L	46.0	-26.7
4.918180	17.7	L	46.0	-28.3

120V/60 Hz Neutral:



Quasi-Peak Measurement

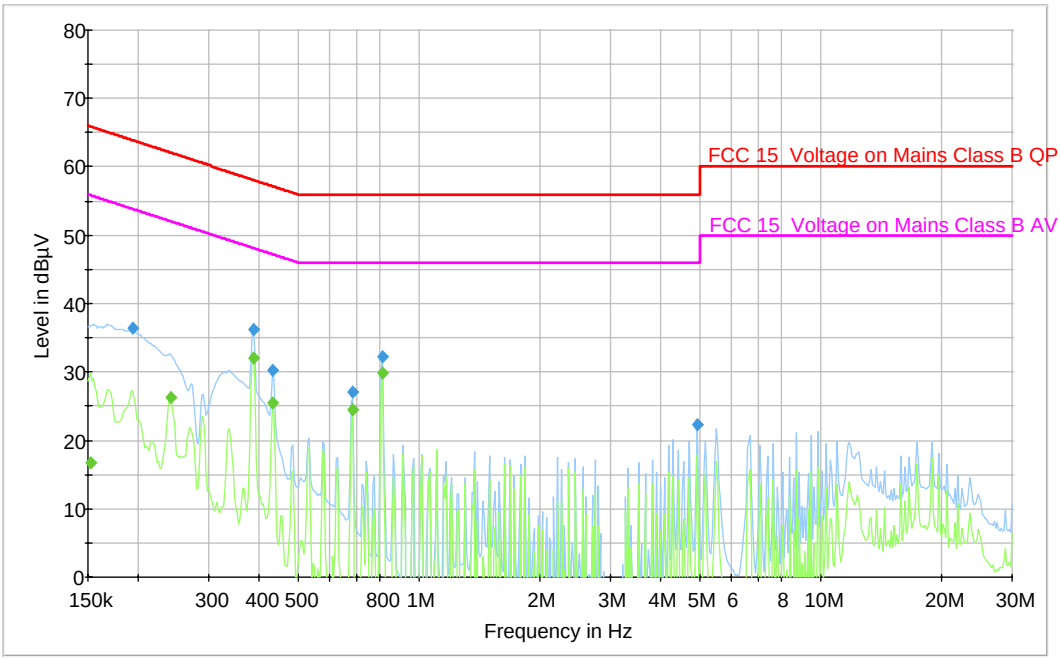
Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.812310	29.2	N	56.0	-26.9

Average Measurement

Frequency (MHz)	Average (dBµV)	Line (L/N)	Limit (dBµV)	Margin (dB)
0.812310	27.0	N	46.0	-19.0
0.681700	21.0	N	46.0	-25.0
4.193660	20.9	N	46.0	-25.1
4.726090	20.9	N	46.0	-25.1
3.662390	20.2	N	46.0	-25.8
3.811250	19.4	N	46.0	-26.6

Murata Antenna

120V/60 Hz Line:



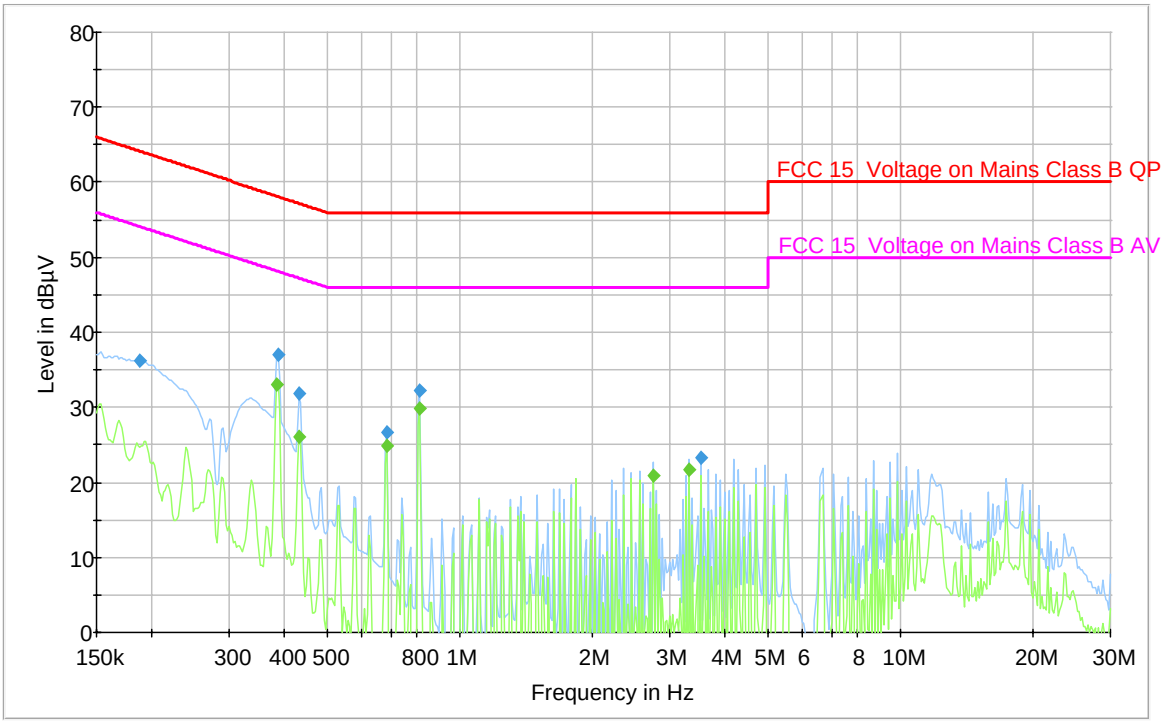
Quasi-Peak Measurement

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.387160	36.2	L	58.1	-22.0
0.812310	32.2	L	56.0	-23.8
0.432850	30.2	L	57.2	-27.0
0.193570	36.4	L	63.9	-27.5
0.681700	27.1	L	56.0	-28.9
4.918180	22.2	L	56.0	-33.8

Average Measurement

Frequency (MHz)	Average (dBµV)	Line (L/N)	Limit (dBµV)	Margin (dB)
0.387160	32.0	L	48.1	-16.1
0.812310	29.9	L	46.0	-16.1
0.681700	24.5	L	46.0	-21.6
0.432850	25.4	L	47.2	-21.8
0.241950	26.2	L	52.0	-25.8
0.152410	16.6	L	55.9	-39.2

120V/60 Hz Neutral:



Quasi-Peak Measurement

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.187490	36.2	N	64.1	-28.0
0.387160	37.0	N	58.1	-21.1
0.432850	31.7	N	57.2	-25.5
0.681700	26.7	N	56.0	-29.3
0.812310	32.3	N	56.0	-23.7
3.519350	23.4	N	56.0	-32.7

Average Measurement

Frequency (MHz)	Average (dBµV)	Line (L/N)	Limit (dBµV)	Margin (dB)
0.384090	33.1	N	48.2	-15.1
0.432850	26.0	N	47.2	-21.2
0.681700	24.8	N	46.0	-21.2
0.812310	29.8	N	46.0	-16.2
2.749070	20.9	N	46.0	-25.1
3.328420	21.6	N	46.0	-24.4