



Wireless Transceiver Test Report
FCC id: A94VTZ, Industry Canada 3232A-VTZ




Certificate # 1514.1

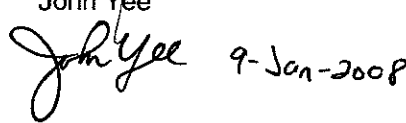
Report number: EMC.VTZ.07.329.2

Prepared for: Bose Corporation
DCE - EMC
1 New York Ave, Framingham MA 01701

Product Tested: Bose® QuietComfort® 3 *Bluetooth*® Communications Kit

Standards: FCC part 15.249
ANSI C63.4 (2003)
RSS210 issue 7 (Jan 2007) section A2.9
RSS-Gen issue 2 (June 2007)

Report prepared by: Peter Boers
Signature: 

Report reviewed by: John Yee
Signature:  9-Jan-2008

Report issue date: Jan 9, 2007

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1 Report Summary

1.1 Product : Bose® QuietComfort® 3 *Bluetooth*® Communications Kit
FCC ID: A94VTZ
Industry Canada: 3232A-VTZ

1.2 Client : Bose Corporation
1 New York Ave, Framingham MA 01701

1.3 Applicable Standards: FCC part 15.249
RSS210 issue 7 (Jan 2007)
RSS-Gen issue 2 (June 2007)

Test Results: Pass Fail

1.4 Test Laboratory Bose DCE laboratories
1 New York Ave
Framingham, MA 01701.
IC registration : 3232A
FCC site registration under A2LA cert. #1514

This report relates only to the items tested.

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2 Product description

The Bose® QuietComfort® 3 *Bluetooth*® Communications Kit is a bluetooth adaptor for the Bose QC3 noise canceling headset. It operates from the internal (rechargeable) battery in the QC3 headset. The battery in the QC3 has to be removed and placed in a dedicated charger in order to be re-charged.

It has an on-off switch, volume up and down buttons and a connect button, a custom connector to the QC3 headset and a generic 3.5 mm audio connector for connection to an MP3 player. When the Bluetooth adaptor is operational (communicating to a cell phone), the MP3 player connection is disabled.

3. Applicable standards, requirements and tests

RSS-GEN	RSS210	FCC part 15	Test references.
5.3		15.15(b)	There are no user-accessible transmitter controls in the device under test.
		15.27	There are no special devices such as shielded cables or special connectors required for compliance to the applicable standards.
	2.1	15.215(c)	Frequency stability/range. The device operates from 2402 to 2480 MHz (carrier frequency) and is Xtal controlled.
		15.203	Antenna requirement: The device contains an integral antenna, which is not accessible or modifiable by the customer.
	2.2(b)	15.205	The device does not operate in either the US or Canadian restricted bands.
7.2.2		15.207	Conducted emissions: Not applicable, device is operated from the battery in the QC3 noise-canceling headset.
		15.109	Radiated emissions, un-intentional device: Complies. Measurement results are detailed in section 5.1
	A2.9	15.249 (a)	Transmitter output power: Complies. Measurement results are detailed in section 5.2
7.2.3	2.2(c)	15.209	Transmitter spurious emissions: Complies. Measurement results are detailed in section 5.3.
6(b)	2.3		Receiver spurious emissions: Complies. Measurement results are detailed in section 5.4

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4 Environmental Conditions

All testing is performed under the following conditions, unless otherwise defined in the detail test report section.

Temperature: 22 ± 4 °C
 Humidity: 30 – 60 % RH

5. Detailed Test Results.

5.1. Radiated emissions 30 MHz – 1 GHz

5.1.1. Requirements

FCC rules part 15.109 (g), CAN-CSA-CISPR22 class B

Frequency MHz	Limit in dBµV/m @3m		
	Quasi-peak	Average	Peak
30 – 88	40		
88-216	43.5		
216 - 960	46		
> 960		54	74

5.1.2. Test setup details

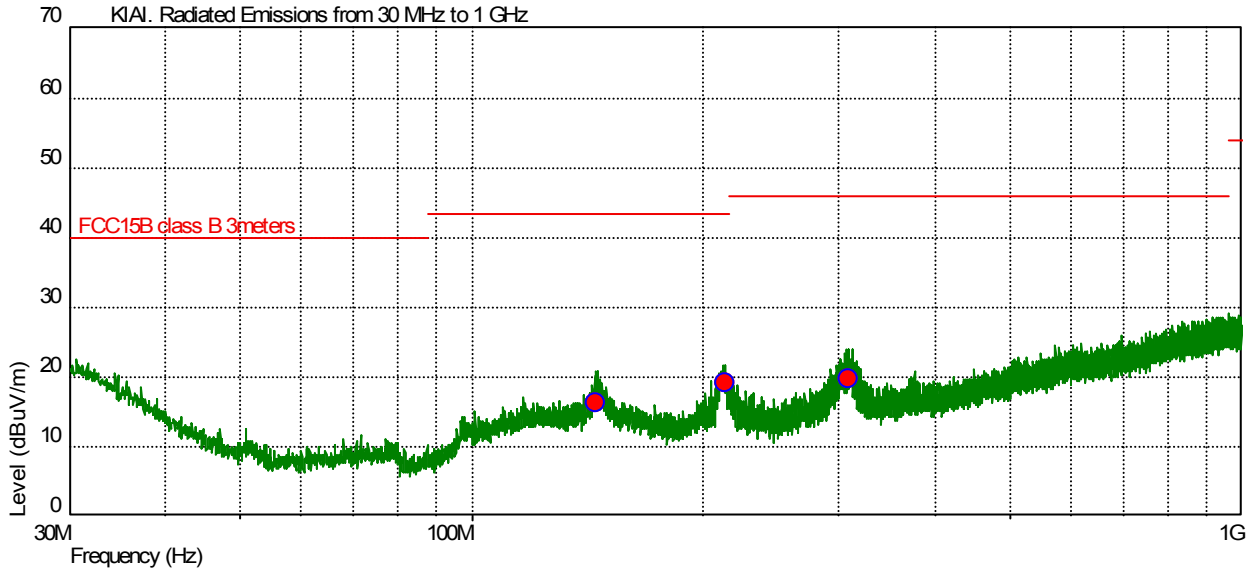
The EUT consist of a single chip Bluetooth module driven by a 16 MHz Xtal. Based on this the EUT was tested for radiated emissions from the un-intentional part of the circuitry in the frequency range from 30 – 1000 MHz. The EUT was connected to a Bose QC3 acoustic noise canceling headset (to provide DC power) and mounted in a way resembling normal installation / wear by the user.

Radiated emissions were measured in Horizontal and Vertical polarization, 360 degrees around the EUT at an EUT-antenna distance of 3 meters, and the antenna height was adjusted for maximum emissions.

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5.1.3. Test data



Legend: Green trace – peak scan results.
 Red dots: manual QP measurements with CISPR-16 compliant receiver.

QP results

Frequency (Hz)	Level (dBuV/m)	Height (m)	Pol.	Angle (Deg)	Limit (dBuV/m)	Margin (dBuV/m)	Detector
145.15 M	16.3	1.00	--	0	43.5	-27.20	QP
212.8 M	19.3	1.00	--	0	43.5	-24.20	QP
307.95 M	19.7	1.00	--	59	46.0	-26.30	QP

Conclusion: EUT passes with more than 20 dB margin.

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5.1.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service due date
Receiver	Rohde & Schwarz	ESIB40	TN1560	1/10/2008
Antenna	Sunol Sciences	JB6	TN1541	6/11/2008

5.1.5. Test information

Date of test:	Nov 21, 2007	Test location :	DCE - Maxwell House
EUT serial:	108	Test routine:	C3 emissions
Tested by:	Peter Boers	Test result:	Pass with > 20 dB margin

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5.2. Output power

5.2.1. Requirements.

FCC 15.247(a), RSS-210 section A2.9 (a).

Fundamental Frequency (MHz)	Field strength of fundamental (milliVolts / meter)	Field strength of harmonics (microVolts / meter)
2400 – 2483.5	50	500

The field strength limit is defined for the average value, with an implied peak limit 20 dB above the average value.

5.2.2. Test setup details.

The EUT was placed in test mode and controlled with the R&S CMU200 radio test unit. The EUT hopping sequence was stopped and the TX frequency was forced to the low, mid or high end of the frequency band for Bluetooth devices. The OBW of the EUT was measured to make sure output power measurements could be made with an appropriate resolution bandwidth of the receiver. The OBW was approximately 750 kHz, and measurements were made with an RBW of 1 MHz, with both a peak and average detector.

The output power was measured in Horizontal and Vertical polarization, 360 degrees around the EUT at an EUT-antenna distance of 3 meters, and the antenna height was adjusted for maximum emissions.

The EUT was operated with a Rohde & Schwarz CMU200 Universal radio communications tester in Bluetooth mode. The BT protocol was "Headset", the pattern alternating ones and zeros (1010101010) and the packet type was DH1.

The duty cycle was measured by placing the Spectrum Analyzer in zero span mode and measuring the on-time versus the cycle time. The duty cycle was 33% and the cycle time was 1.24 milliseconds.

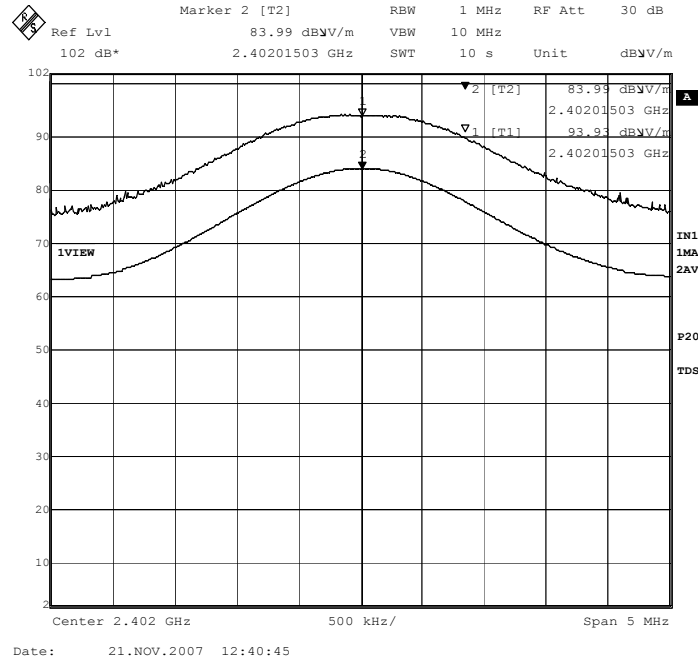
The EUT was placed on a ANSI C63.4 standard test table and measured when placed in 3 orthogonal directions (X,Y and Z), when power from the QC3 headset. (See successive test setup photos)

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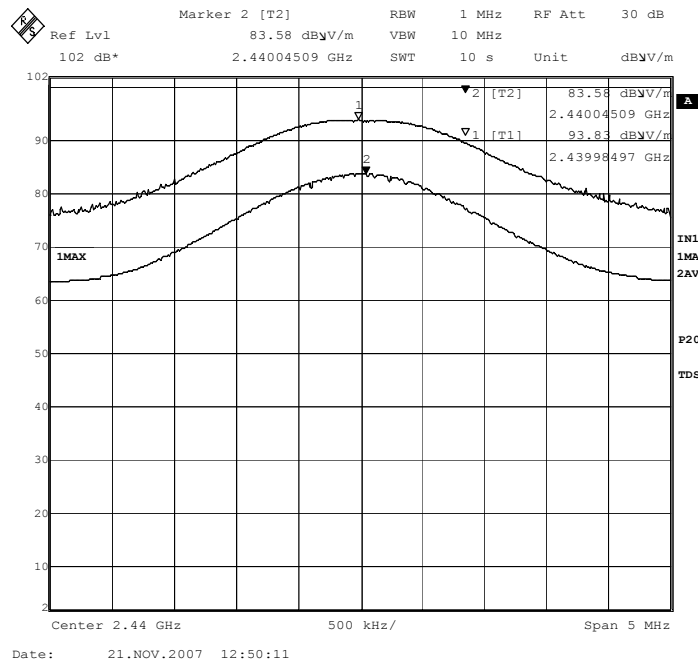


5.2.3. Test data.

EUT in the "X" position, Low band, Table at 300 degrees, 110cm , V pol, peak and average



Mid-band, table at 54, Mast at 109, H pol



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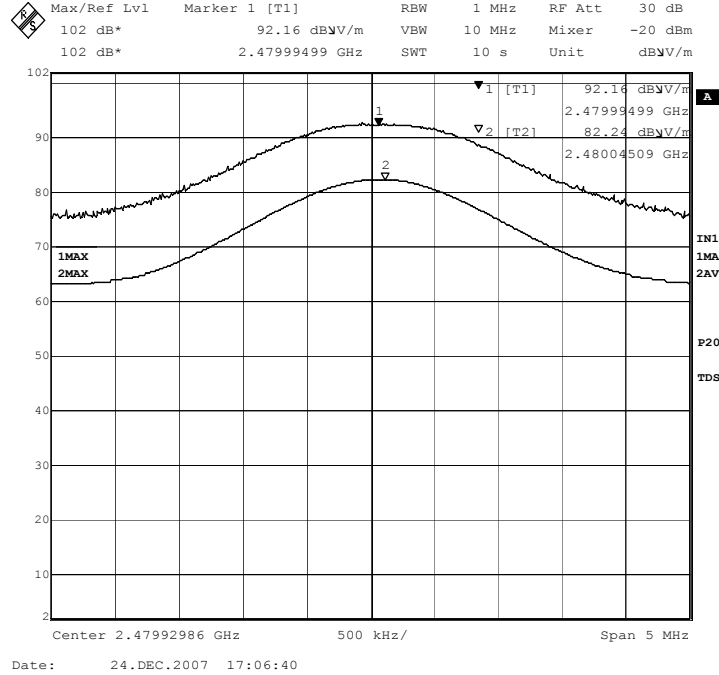


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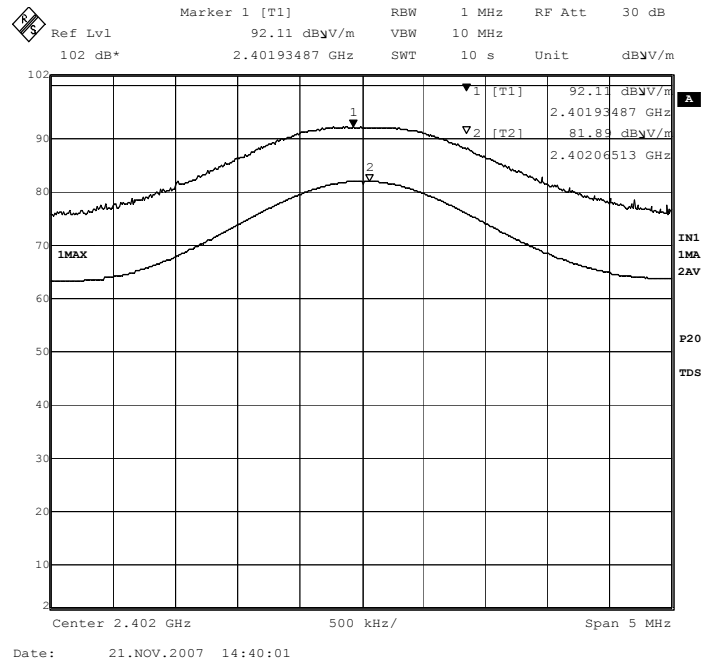


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High band, Table 42, Antenna H 131 cm, peak and average values



EUT in the "Y" position, Low band



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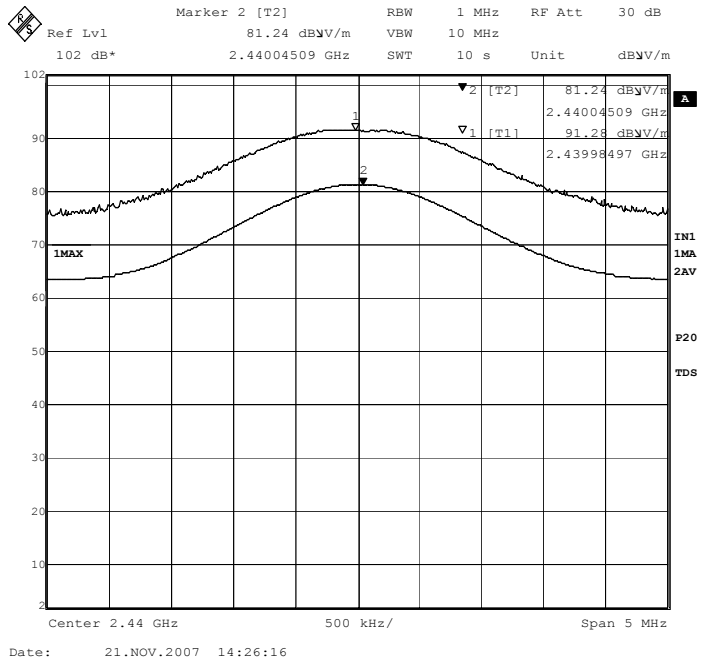


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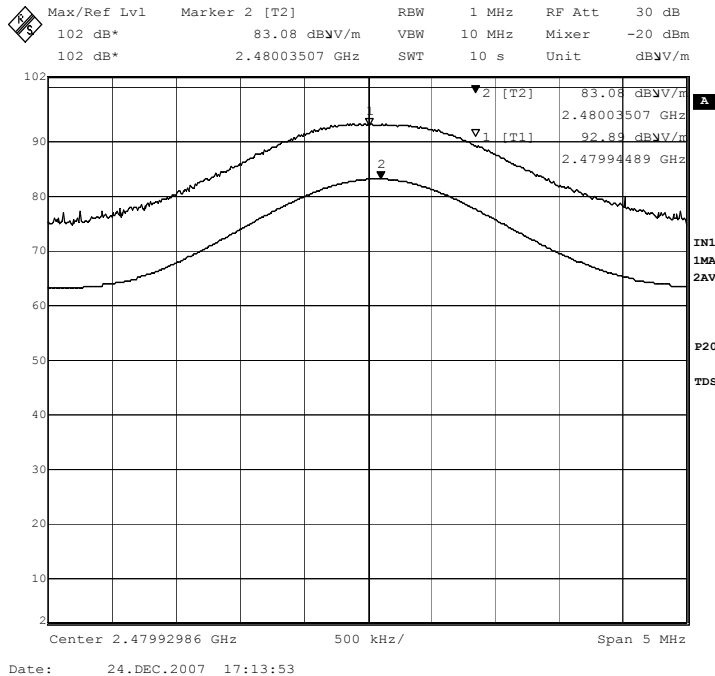


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Mid band



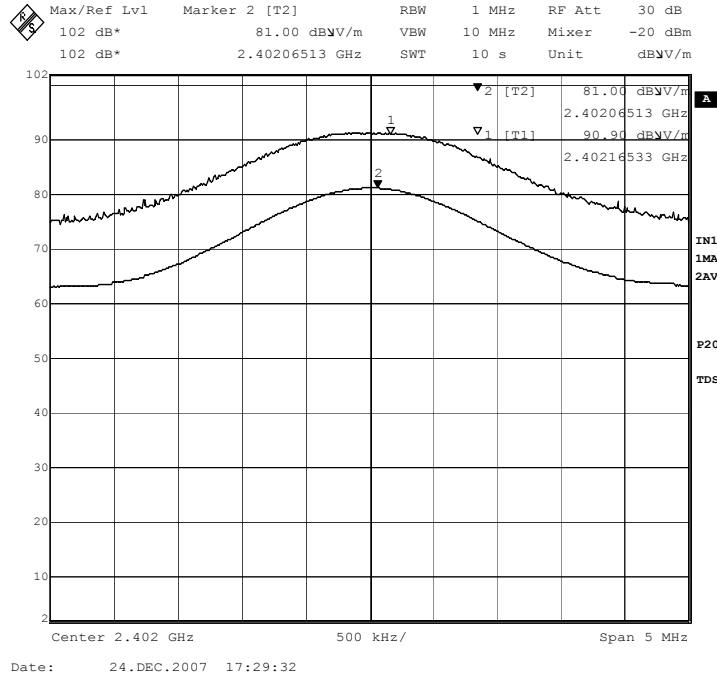
High band



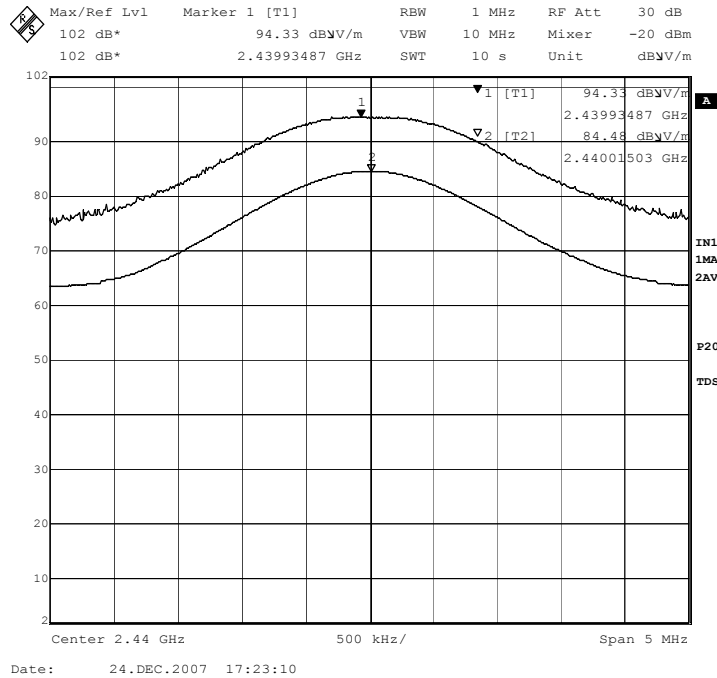
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EUT in the "Z" position, Low band



Mid band



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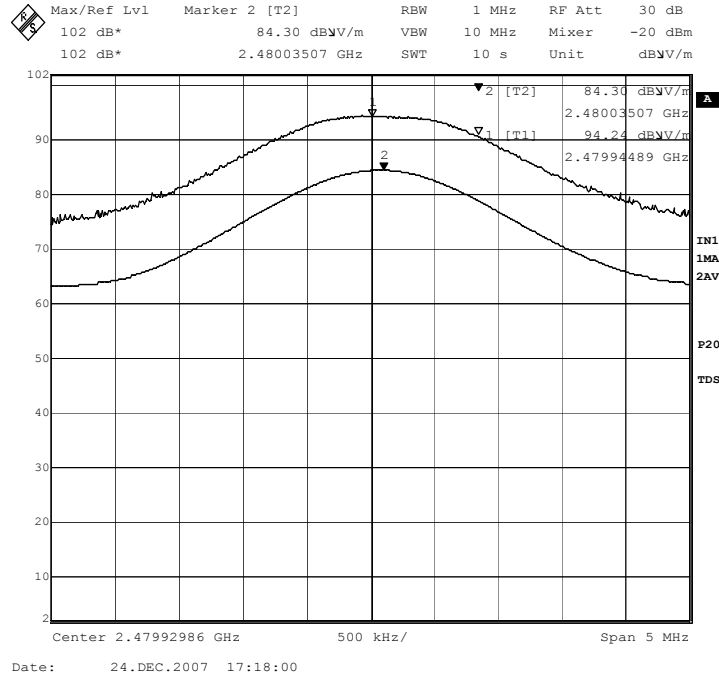


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High band



Summary

Carrier frequency	Average (dBμV/m)		Peak (dBμV/m)	
	Level	limit	level	limit
2402 MHz	84.0	94	93.9	114
2440 MHz	84.5	94	94.3	114
2480MHz	84.3	94	94.2	114

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5.2.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service due date
Receiver	Rohde & Schwarz	ESIB40	TN1560	1/10/2008
Antenna	Sunol Sciences	JB6	TN1541	6/11/2008

5.2.5. Test information

Date of test:	Nov 6, 2007	Test location :	DCE - Maxwell House
EUT serial:	108		
Tested by:	Peter Boers	Test result:	Pass

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5.3. Transmitter Radiated harmonics and spurious emissions

5.3.1. Requirements

FCC part 15.249(d) , RSS-210 section A2.9(b)

Harmonics shall not exceed 500 μ V/m (54 dB μ V/m) at 3 meters. Emissions outside the specified frequency bands shall be attenuated at least 50dB below the level of the wanted signal, but not lower than the limits defined in FCC part 15.209(a) or RSS-210 Table 2.

Since the maximum (average) value of the wanted signal is 87.3 dB μ V/m, the following table represents the limits for spurious emissions and harmonics from the EUT.

FCC rules part 15.209, RSS-210 Table 2

Frequency MHz	Limit in dB μ V/m @3m		
	Quasi-peak	Average	Peak
30 – 88	40		
88-216	43.5		
216 - 960	47		
> 960		54	74

Measurements performed under section 6.1 cover the requirements below 1 GHz.

5.3.2. Test setup details

(1) Frequency range from 1 – 6 GHz

The antenna was placed 3 meters from the EUT, and the spectrum was scanned 360 degrees around the EUT with the antenna height searched from 1 to 4 meters and with H and V polarization. The frequency range from 2400 to 2483.5 MHz (the specified frequency range for the intentional radiator) was omitted from the spectrum scan.

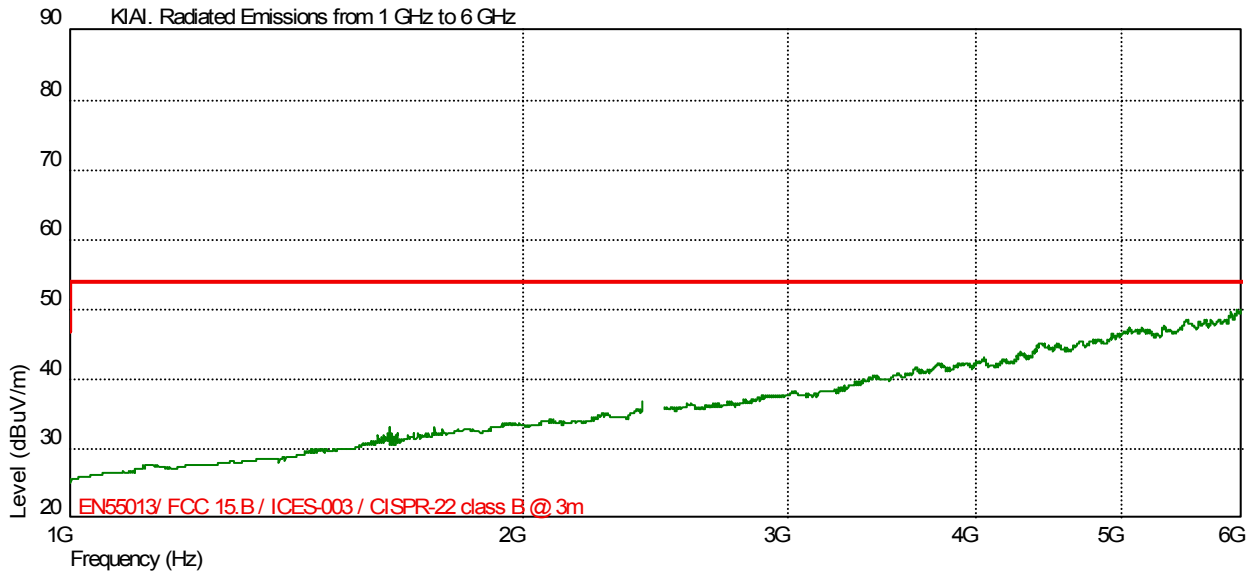
(2) Frequency range from 6 – 25 GHz.

A range of standard gain horn antennas was used at close distance (in order to increase the effective sensitivity of the measurement). Specific attention was paid to possible harmonic frequencies of the intentional radiator. Measurements were initially made with 1 MHz bandwidth and both average and peak detectors. Where sensitivity needs dictated, narrower bandwidths were used with an average detector.



5.3.3. Test data

(1) Frequency range from 1 – 6 GHz



(2) Frequency range from 6 – 25 GHz.

Manual measurements were made a close in distances. No harmonics or spurious emissions were found above the noise floor of the instrumentation. The noise floor of the instrumentation was below the required limit.

5.3.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service due date
Antenna 30M – 6GHz	Sunol Sciences	JB6	TN1541	6/11/2008
Antenna 4 – 8 GHz	AR	AT4003	TN727	10/31/2008
Antenna 8 – 18 GHz	AR	AT4004	TN728	10/31/2008
Antenna 18- 26.5 GHz	ETS	3106-09	TN1307	2/21/2008
Receiver	R&S	ESIB40	TN1560	1/10/2008

5.3.5. Test information

Date of test:	Nov 7, 2007	Test Location	Maxwell House
EUT serial:	108		
Tested by:	Peter Boers Richard Frederick	Test result:	Pass

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5.4. Receiver Spurious emissions

5.4.1. Requirements

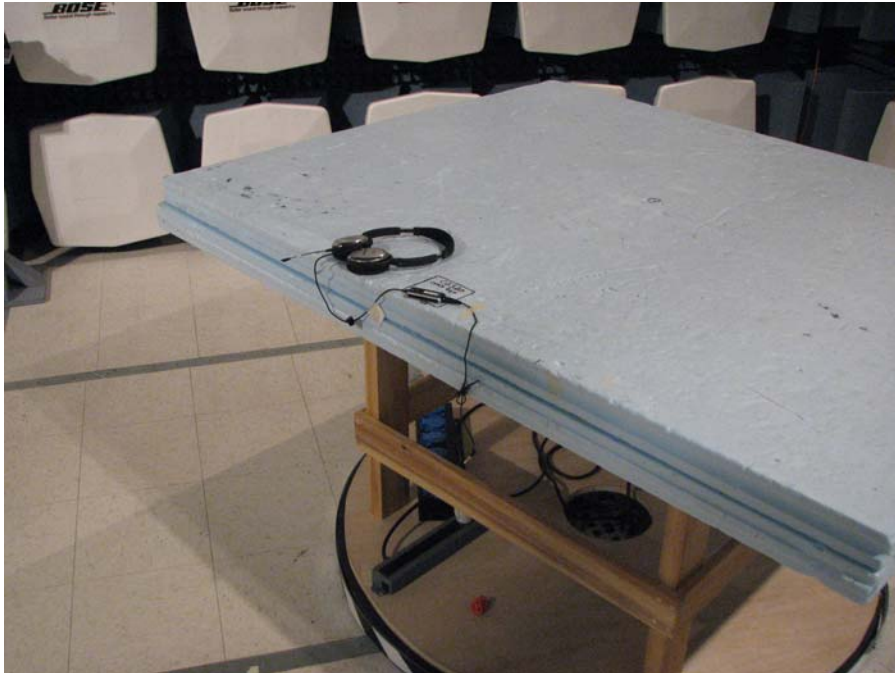
RSS210 section 2.3 and RSS-GEN section 7.2.3

All spurious emissions from receivers shall meet the requirements of RSS-Gen Table 1.

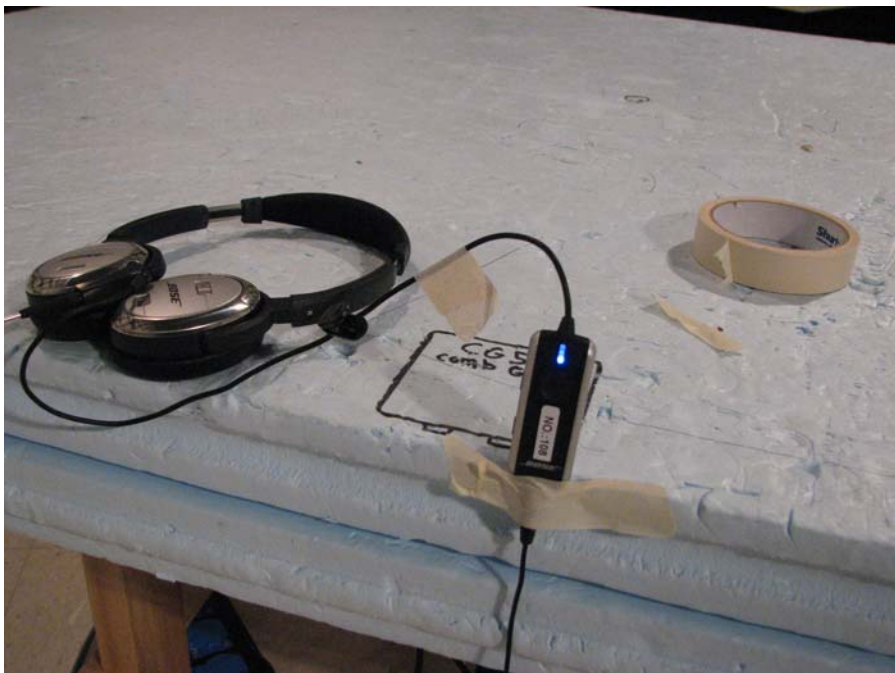
These limits and tests are identical to the tests performed in sections 6.1 and 6.3 of this report. Since the EUT operates in bi-directional mode, spurious emissions from the EUT in receiver mode are measured implicitly in these previous tests.

6 Test Equipment Setup Photos.

EUT in "X" direction



EUT in "Y" direction



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EUT in the "Z" direction



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