

FCC PART 15.239


MEASUREMENT AND TEST REPORT

For

Kensington Computer Products Group
(A Division of ACCO Brands Inc.)

333 Twin Dolphin Drive, Sixth Floor, Redwood Shores, CA 94065, USA

FCC ID: GV333384
Model: K33384US

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Product Type: Short Range Low Power FM Transmitter for iPod
Test Engineer: <u>Dan Corona</u> 	
Report Number: <u>R0702223-239</u>	
Report Date: <u>2007-03-12</u>	
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TABLE OF CONTENTS

1	GENERAL INFORMATION	3
1.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
1.2	MECHANICAL DESCRIPTION	3
1.3	EUT PHOTO	3
1.4	OBJECTIVE	3
1.5	RELATED SUBMITTAL(S)/GRANT(S)	3
1.6	TEST METHODOLOGY	4
1.7	MEASUREMENT UNCERTAINTY	4
1.8	TEST FACILITY	4
2	SYSTEM TEST CONFIGURATION	5
2.1	JUSTIFICATION	5
2.2	EUT EXERCISE SOFTWARE	5
2.3	SPECIAL ACCESSORIES	5
2.4	EQUIPMENT MODIFICATIONS	5
2.5	LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	5
2.6	INTERFACE PORTS AND CABLING	5
2.7	CONFIGURATION OF TEST SETUP	6
2.8	BLOCK DIAGRAM OF TEST SETUP	6
3	SUMMARY OF TEST RESULTS	7
4	§15.203 - ANTENNA REQUIREMENT	8
4.1	APPLICABLE STANDARD	8
4.2	RESULT	8
5	§15.239(A) – OCCUPIED BANDWIDTH AND TURN RANGE	9
5.1	APPLICABLE STANDARD	9
5.2	TEST EQUIPMENT LIST AND DETAILS	9
5.3	ENVIRONMENTAL CONDITIONS	9
5.4	TEST PROCEDURE	9
5.5	PLOT(S) OF TEST DATA	9
5.6	TUNING RANGE	10
5.7	SUMMARY OF TEST RESULT	10
6	§15.205, §15.209(A) AND §15.239(B), (C) - RADIATED EMISSION	12
6.1	APPLICABLE STANDARD	12
6.2	TEST SETUP	13
6.3	TEST EQUIPMENT LIST AND DETAILS	13
6.4	ENVIRONMENTAL CONDITIONS	13
6.5	TEST PROCEDURE	14
6.6	CORRECTED AMPLITUDE & MARGIN CALCULATION	14
6.7	SUMMARY OF TEST RESULT	14
6.8	RADIATED EMISSION TEST RESULT	15

1 GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Kensington Computer Products Group, a division of ACCO Brands, Inc.* product, FCCID: GV333384, model: K33384US, is a hand portable *Short Range/Low Power FM Transmitter* (or Quick Seek FM Transmitter). It is powered by iPod and provides a wireless audio link between an iPod device and a vehicle's FM stereo radio. It features a fully adjustable channel digital tuner with 3-button control. Its adjustable frequency bandwidth range is from 88.1 MHz to 107.9 MHz. The antenna for this device is an internal antenna attached to the main board with a maximum gain of < 0 dBi.

1.2 Mechanical Description

The *Kensington Computer Products Group, a division of ACCO Brands, Inc.*, product, FCCID: GV333384, or the "EUT" as referred to in this report measures 62 mmL x 36 mmW x 10 mmH.

*The test data gathered are from production sample, serial number: 1008, provided by the manufacturer.

1.3 EUT Photo



Additional Photos in Exhibit C

1.4 Objective

This type approval report is prepared on behalf of *Kensington Computer Products Group, a division of ACCO Brands, Inc.* in accordance with FCC Part 15, Subpart C, and section 15.209, and 15.239 rules.

The objective of the manufacturer is to determine compliance with FCC rules, Part 15.239 for device operating in the band 88-108 MHz.

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.

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 ± 2.0 dB 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 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 host system was configured for testing in accordance to FCC Part 15.239.

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

The EUT's power source was derived from the iPod which was fully charged before commencing testing.

2.2 EUT Exercise Software

The software is provided by customer. The EUT exercise program used during radiated testing was designed to exercise the system components.

2.3 Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

2.4 Equipment Modifications

No modifications were made to the EUT.

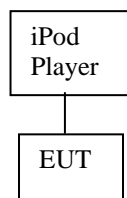
2.5 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Apple	iPod Player	A1099	JQ507FRHSAY

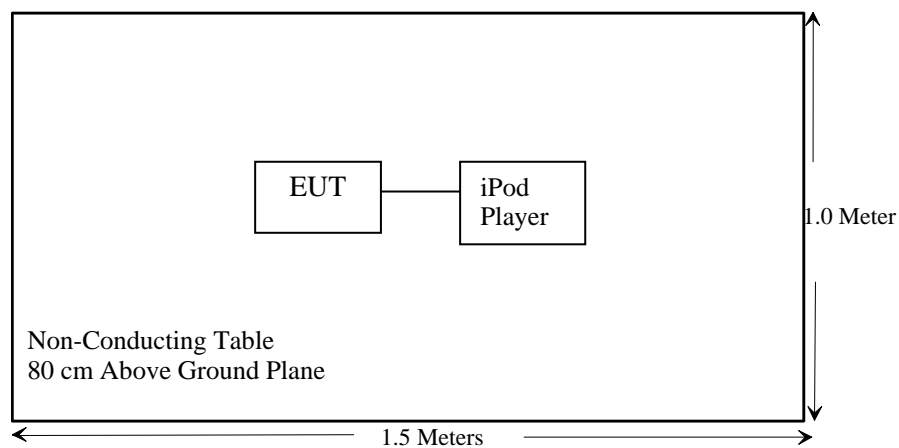
2.6 Interface Ports and Cabling

Cable Description	Length (M)	From	To
N/A	N/A	EUT	iPod Player

2.7 Configuration of Test Setup



2.8 Block Diagram of Test Setup



3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.203	Antenna Requirement	Compliant
§15.239 (a)	Occupied Bandwidth	Compliant
15.239 (a) (OOB)	Out of Band emissions	Compliant
§15.205, §15.239(b)	Radiated Emission	Compliant
15.209, 15.239 (c)	General Emission Limits	Compliant

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 antenna for this device is an internal antenna permanently attached to the main board in a fashion not readily accessible to the end user with a maximum gain of < 0 dBi therefore complying with FCC § 15.203 rule. The end user will not be able to change the antenna with any other *antennae*.

☒ **Compliant**

☐ **N/A**

5 §15.239(a) – OCCUPIED BANDWIDTH AND TURN RANGE

5.1 Applicable Standard

As per §15.239(a), emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88–108 MHz.

5.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

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

5.3 Environmental Conditions

Temperature:	20 °C
Relative Humidity:	48%
ATM Pressure:	101.8 kPa

* The testing was performed by Dan Corona on 2007-02-23 & 24.

5.4 Test Procedure

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

5.5 Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

Channel	Transmitting Frequency (MHz)	99% Measured Bandwidth (kHz)	26 dB Measured Bandwidth (kHz)	Limit (kHz)	Result
Low	88.1	76.9928	112.854	200	Compliant
Middle	98.1	86.0390	130.583	200	Compliant
High	107.9	90.9952	133.168	200	Compliant

Note: The EUT was transmitting music at maximum volume input.

5.6 Tuning Range

The maximum tuning range of the transmitter has been verified. The tuning controls were adjusted manually to each channel. All Channels were within 88-108 MHz range.

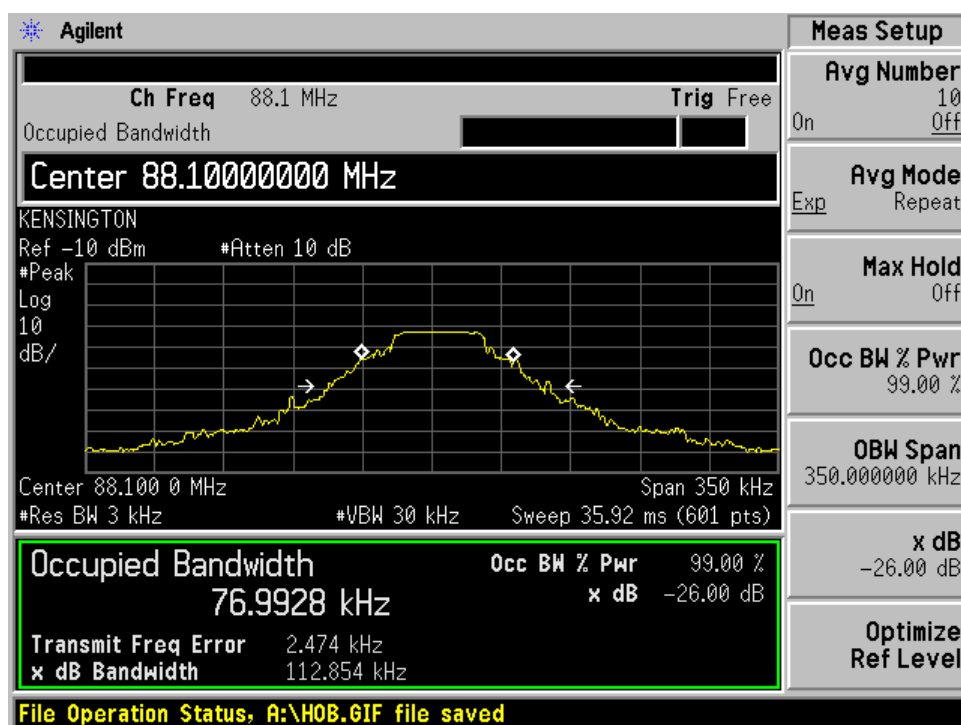
5.7 Summary of Test Result

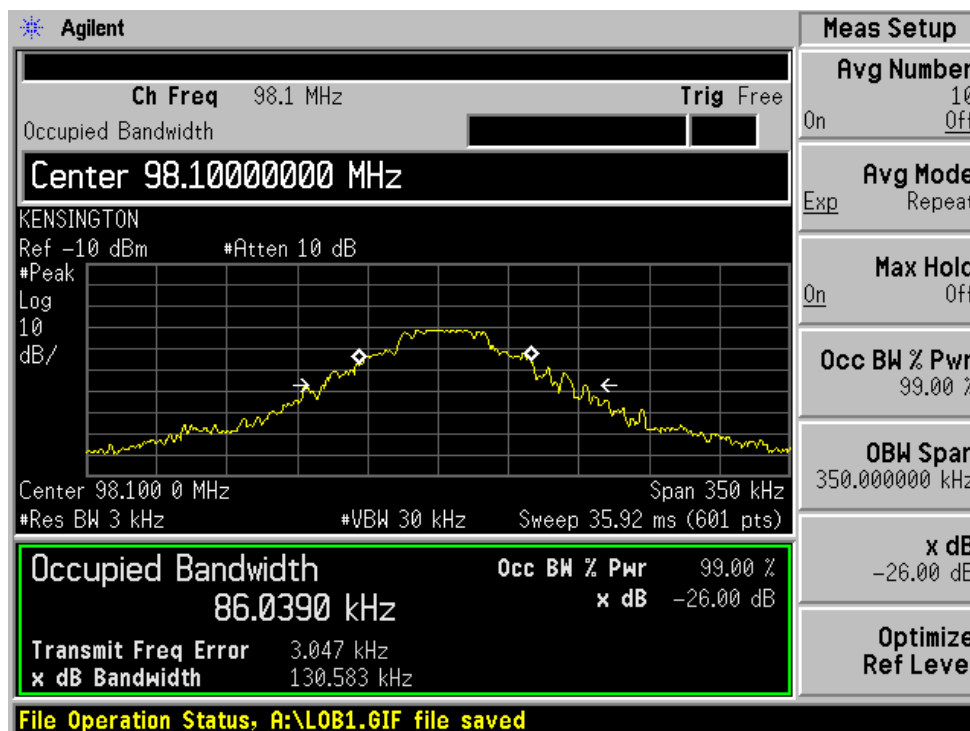
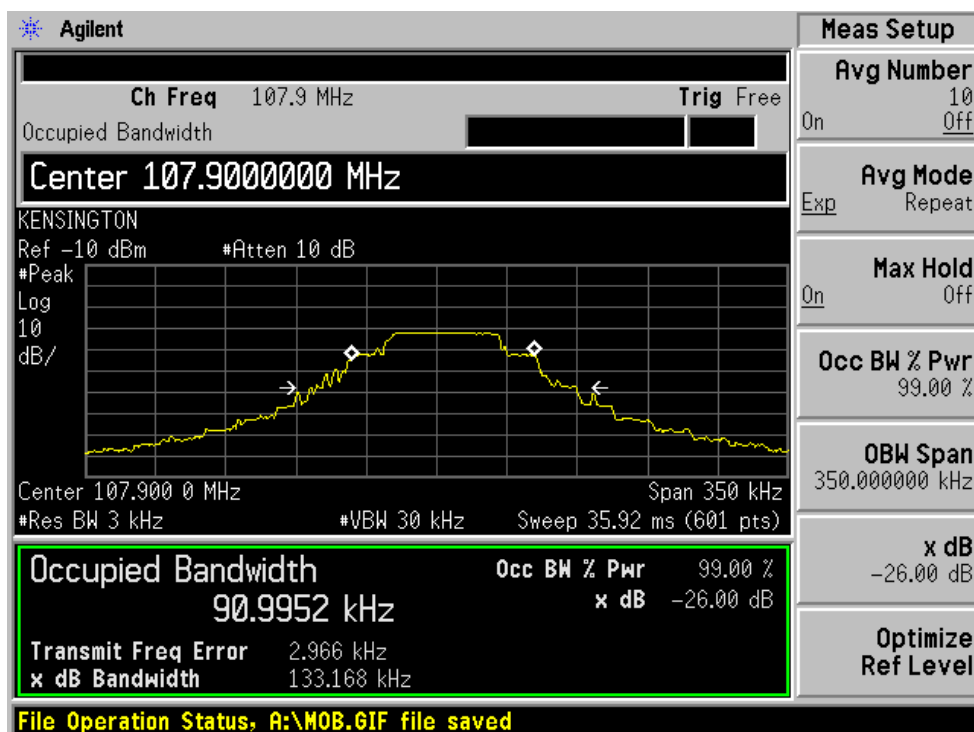
As per §15.239(a), transmitting frequency from the intentional radiator are confined within a band 200 kHz wide centered on the operating frequency; therefore, complying with the standard rule.

As per §15.239(a) (Out of Band Emissions), the out of band frequencies lie wholly within the frequency range of 88-108 MHz; therefore, complying with the standard rule.

Please refer to the plots:

Low Channel, $f = 88.1$ MHz



Middle Channel, $f = 98.1$ MHzHigh Channel, $f = 107.9$ MHz

6 §15.205, §15.209(a) and §15.239(b), (c) - RADIATED EMISSION

6.1 Applicable Standard

As per §15.239 (b), the field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

As per §15.239 (c), the field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in §15.209.

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		

6.2 Test Setup

The radiated emissions tests were performed in the 3-meter chamber test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sonoma Instrument	Amplifier, Pre (.1 ~2500MHz)	317	260407	2006-03-20
Rohde & Schwarz	Receiver, EMI Test	100044	ESCI 1166.5950K03	2007-02-19
Sunol Science	30MHz ~ 3 GHz Antenna	JB3	A020106-2 / S006628	2006-03-14
Sunol Science	System Control	SV99V	N/A	N/A

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

6.4 Environmental Conditions

Temperature:	20° C
Relative Humidity:	48%
ATM Pressure:	101.8 kPa

* The testing was performed by Dan Coronio on 2007-02-23 & 24.

6.5 Test Procedure

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

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

6.6 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 relative compliance with the applicable limit. For example, a margin of -7dB means the emissions is 7dB below the maximum limit. The equation for margin calculation is as follows:

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

6.7 Summary of Test Result

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.209 and 15.239, and had the margin from the limit of:

The system was investigated from 30 MHz to 1000 MHz.

-7.9 dB at 88.0775MHz in the **Vertical** polarization, Fundamental Field Strength

-0.2 dB at 176.2875 MHz in the **Horizontal** polarization, Spurious Emission 30MHz-1000MHz, Low Channel

-3.5 dB at 294.3837MHz in the **Horizontal** polarization, Spurious Emission 30MHz-1000MHz, Middle Channel

-1.3 dB at 323.6075MHz in the **Horizontal** polarization, Spurious Emission 30MHz-1000MHz, High Channel

As per §15.205, §15.239 (b), the field strength of any emissions within the permitted 200 kHz band does not exceed the limit; therefore, complying with the standard rule.

As per §15.209, §15.239 (c), the field strength of any emissions radiated on any frequency outside of the specified 200 kHz band does not exceed the general radiated emission limits in §15.209; therefore, complying with the standard rules.

6.8 Radiated Emission Test Result

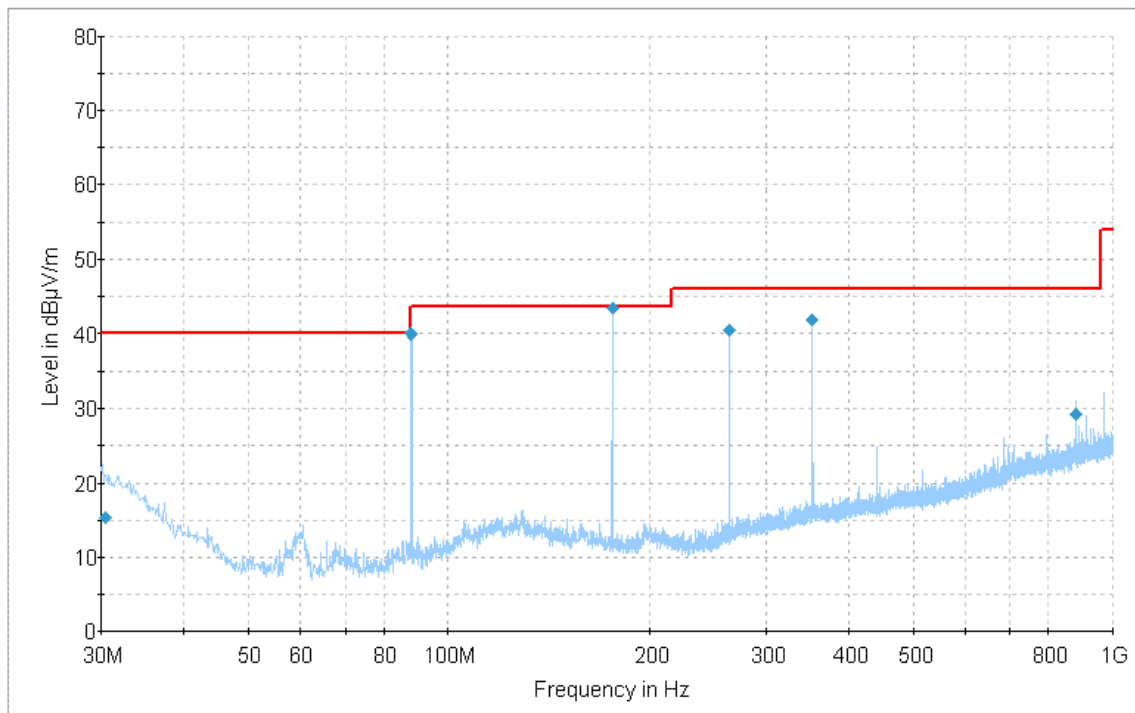
6.8.1 Fundamental Field Strength @ 3 m

Frequency (MHz)	Reading Average	Antenna Height (meter)	Polarity (H/V)	Turn-table (degrees)	Correction Factor (dBuV/m)	FCC PART 15.239	
	(dBuV/m)					Limit (dBuV/m)	Margin (dB)
88.077500	40.1	2.1	H	80.0	-16.7	48.0	-7.9
107.902500	34.4	2.6	H	74.0	-12.6	48.0	-13.6
98.082500	33.6	3.1	H	74.0	-14.5	48.0	-14.4

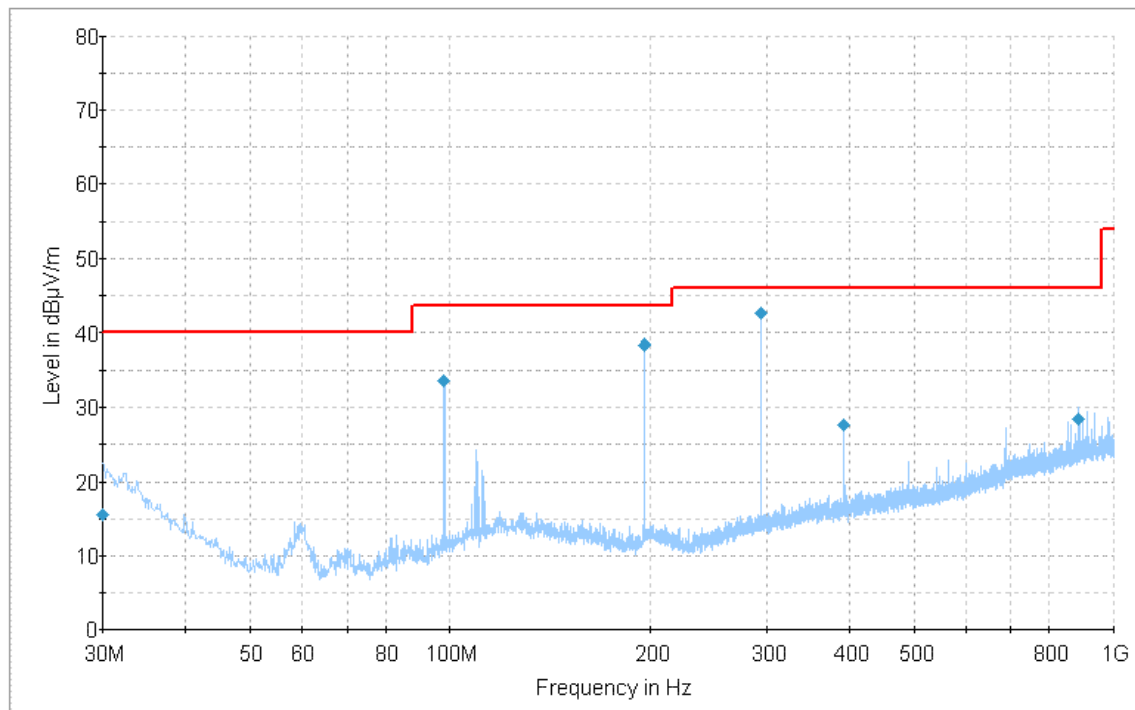
6.8.2 Spurious Emission 30MHz-1000MHz @ 3 m

Frequency (MHz)	Reading Quasi Peak (dBuV/m)	Antenna Height (meter)	Polarity (H/V)	Turn-table (degrees)	Correction Factor (dBuV/m)	FCC PART 15.239/15.209	
						Limit (dBuV/m)	Margin (dB)
Low Channel							
176.287500	43.3	1.3	H	68.0	-13.1	43.5	-0.2
352.282500	41.8	1.0	H	90.0	-9.3	46.0	-4.2
264.433750	40.4	1.2	H	79.0	-11.7	46.0	-5.6
880.812500	29.2	1.0	H	90.0	-2.5	46.0	-16.8
Middle Channel							
294.383750	42.5	1.0	H	84.0	-10.6	46.0	-3.5
196.233750	38.3	1.7	H	84.0	-12.4	43.5	-5.2
883.176250	28.5	1.0	H	99.0	-2.5	46.0	-17.5
392.535000	27.7	1.0	H	262.0	-9.1	46.0	-18.3
High Channel							
323.607500	44.7	1.0	H	274.0	-9.9	46.0	-1.3
215.876250	41.1	1.4	H	84.0	-12.8	43.5	-2.4
755.680000	29.1	1.1	H	84.0	-3.8	46.0	-16.9
110.877500	7.3	2.9	H	2.0	-12.1	43.5	-36.2

Low Channel



Middle Channel



High Channel

