

TEST REPORT

Applicant Name & : Masterbuilt Manufacturing Inc.
Address : 1 Masterbuilt Court Columbus, Georgia, 31907, USA

Sample Description

Product : 30" Black Electric Smoker
40" Black Electric Smoker

FCC ID : YHXESQ-3040C3

Model No. : 20070312, 20072112, 20072212, 20072312, 20072412, 20072912
20070512, 20072512, 20072612, 20072712, 20072812, 20073012

Electrical Rating : 30" Black Electric Smoker: 120VAC, 60Hz, 800W, 6.7A
40" Black Electric Smoker : 120VAC, 60Hz, 1200W, 10A
Remote controller: 2*1.5V/AAA battery

Frequency : 2.440GHz Transceiver

Date Received : 03 Feb.,2012

Date Test Conducted : 10 Feb.,2012 – 10 Feb.,2012

Test standards : **FCC Part 15: 2010**

Test Result : Pass

Conclusion : The submitted samples complied with the above rules/standards.

Remark : None.

*****End of Page*****

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23 Apr.,2012 *Date*

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CONTENT

TEST REPORT	1
CONTENT	2
1. General Description	3
1.1 Product Description	3
1.2 Related Submittal (s) / Grants	3
1.3 Test Methodology	3
1.4 Test Facility.....	4
1.5 Measurement Uncertainty	5
2. System Test Configuration	5
2.1 Justification	5
2.2 EUT Exercising Software.....	6
2.3 Special Accessories	6
2.4 Equipment Modification	6
2.5 Support Equipment List and Description.	6
3. Summary of Test Results	6
3.1 Antenna Requirement	6
3.2 Conducted Emission.....	6
3.3 Radiated Emission.....	9
3.4 Band Edges Measurement.....	13
4. Appendix III - Document List.....	18

1. General Description

1.1 Product Description

The Equipment Under Test (EUT) is a transceiver for Black Electric Smoker with RF at 2.440GHz. It is powered by AC mains:120V/60Hz.

During normal use, it send temperature information (probe) to remote control, when the "meat probe" button on remote control is pressed and receive control command (temp.and time) from remote control.

Antenna Type: internal integrated antenna.

The model: 20070312, 20072112, 20072212, 20072312, 20072412, 20072912, 20070512, 20072512, 20072612, 20072712, 20072812, 20073012 are the same in hardware and software aspect. The only differences are the appearance, and model no.for trading purpose.

The power of 20070512, 20072512, 20072612, 20072712, 20072812, 20073012 is 1200W.

The power of 20070312, 20072112, 20072212, 20072312, 20072412, 20072912 is 800W

We tested the black Electric Smoker, model:20070312, to determine if it was in compliance with the relevant FCC standards. We found that the unit met the requirements of FCC part 15.249. The worst case's test data was presented in this test report.

1.2 Related Submittal (s) / Grants

The FCC ID of corresponding transceiver for this transceiver is YHXESQ-3040R3.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 :2003. Radiated emission measurement was performed in semi-anechoic chamber room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

Conducted emission test was performed according to ANSI C63.4: 2003. The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The vertical conducting plane or wall of a screened room shall be located 40 cm to the rear of the EUT. All other surfaces of tabletop EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs. The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane(Ground Reference Plane).And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

1.4 Test Facility

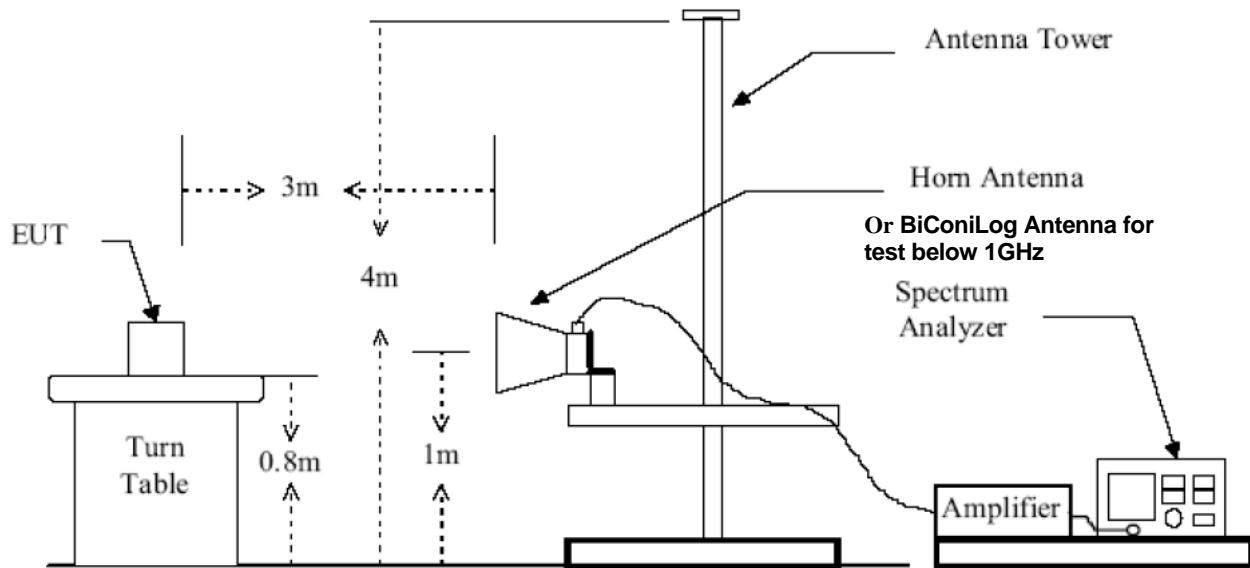
The Radiated Emission test is performed at:

Compliance Certification Services (Shenzhen) Inc. located at No.10-1Mingkeda Logistics Park, No.18Huanguan South RD. Guanlan Town, Baoan District Shenzhen China. This test facility and site measurement data have been fully placed on file with the FCC, test firm registration number is 441872.

Test Equipment List

Serial No.	Equipment	Manufacturer	Model No.	Cal. Date	Due Date
100783	Receiver	R&S	ESCI	19-Mar-11	19-Mar-12
2001/001	LISN	SCHAFFNER	NNB42	26-May-11	26-May-12
D286	Horn Antenna	SCHWARZBECK	BBHA9120D	19-Mar-11	19-Mar-12
US44300399	PSA Series Spectrum Analyzer	Agilent	E4446A	19-Mar-11	19-Mar-12
5082	Bilog Antenna	SCHAFFNER	CBL6143	03-Jun-11	03-Jun-12
1411843	Amplifier	MITEQ	AM-1604-3000	18-Mar-11	18-Mar-12

Test setup figure



Test setup figure

1.5 Measurement Uncertainty

Conducted Emission: 3.18 dB in the frequency range of 9kHz-30MHz at a level of confidence of 95%.

Radiated Emission: 3.79dB in the frequency range of 30MHz-200MHz, 3.62dB in the frequency range of 200MHz-1000MHz, 5.04dB in the frequency above 1GHz at a level of confidence of 95%.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2. System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The EUT was powered by 120V/60Hz in the testing.

Type of modulation: GFSK modulation, and only the worst data was reported in this report.

For maximizing emissions, the unit was placed in the center of the turntable, and the turntable was rotated through 360°, the antenna height was varied from 1 meter to 4 meters

above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Chapter 3.

2.2 EUT Exercising Software

There was no special software to exercise the device.

2.3 Special Accessories

No special accessories used.

2.4 Equipment Modification

Any modifications installed previous to testing by Masterbuilt Manufacturing Inc will be incorporated in each production model sold/leased in the United States. No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

2.5 Support Equipment List and Description

N/A

3. Summary of Test Results

FCC Rules	Description of Test	Result
15.203	Antenna Requirement	Pass
15.207	Disturbance Voltage at the Mains Terminals	Pass
15.249	Radiated Emission	Pass
15.249	Band Edges Measurement	Pass

Remark: When determining the test results, measurement uncertainty of tests has been considered.

3.1 Antenna Requirement

The EUT Antenna Type: internal integrated antenna.

3.2 Conducted Emission

The data on the following page lists the significant emission frequencies, emission level and the limit of compliance. Judgement: Passed by 15.4 dB.at 24.097MHz

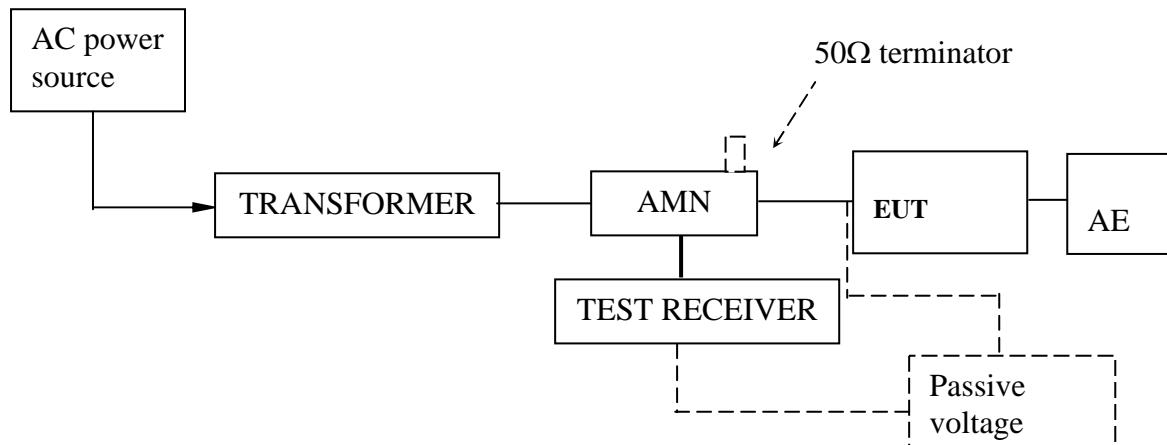
3.2.1 Conducted Emission Limits

According to FCC 15.207, 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 150kHz to 30MHz, shall not exceed the limits in the following table:

Frequency of emission(MHz)	Conducted Limit (dBuV)	
	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

3.2.2 Block Diagram of Test Setup



3.2.3 Conducted Emission Test Data

Applicant: Masterbuilt Manufacturing Inc.
Model No: 20070312
Operation: EUT on transmitting operation

Date of Test: 10 Feb.,2012

Conducted Emissions**Pursuant to FCC 15.207: Conducted Emissions Requirement**

	Frequency [MHz]	Quasi-Peak		Average	
		Disturbance level [dB(uV)]	Permitted limit [dB(uV)]	Disturbance level [dB(uV)]	Permitted limit [dB(uV)]
L	3.010	15.7	56.0	12.3	46.0
	4.017	17.2	56.0	14.4	46.0
	11.872	10.8	60.0	6.3	50.0
	16.066	26.4	60.0	25.7	50.0
	20.081	19.5	60.0	17.4	50.0
	24.097	35.4	60.0	34.6	50.0
N	12.049	22.8	60.0	20.5	50.0
	16.065	24.6	60.0	23.9	50.0
	20.083	25.5	60.0	24.7	50.0
	24.098	23.7	60.0	21.3	50.0
	26.106	29.6	60.0	29.0	50.0
	28.114	28.7	60.0	27.5	50.0

3.3 Radiated Emission

Data is included worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.3.1 Radiated Emission Limits

According to FCC 15.249, operating within the bands 2400-2483.5 MHz, the field strength of emissions from intentional radiators operated within this frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
2400 - 2483.5	50	500

3.3.2 Test Setup

Reference 1.4

3.3.3 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$\begin{aligned} \text{FS} &= \text{RA} + \text{AF} + \text{CF} - \text{AG} + \text{PD} + \text{AV} \\ \rightarrow \quad \text{FS} &= \text{RA} + \text{Correct Factor} + \text{AV} \end{aligned}$$

Where FS = Field Strength in dB μ V/m
RA = Receiver Amplitude (including preamplifier) in dB μ V
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB
Correct Factor = AF + CF - AG + PD

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$\text{FS} = \text{RA} + \text{AF} + \text{CF} - \text{AG} + \text{PD} + \text{AV}$$

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$\begin{aligned} \text{RA} &= 62.0 \text{ dB}\mu\text{V} \\ \text{AF} &= 7.4 \text{ dB} \\ \text{CF} &= 1.6 \text{ dB} \\ \text{AG} &= 29.0 \text{ dB} \\ \text{PD} &= 0 \text{ dB} \\ \text{AV} &= -10 \text{ dB} \end{aligned}$$

$$\text{Correct Factor} = 7.4 + 1.6 - 29.0 + 0 = -20 \text{ dB}$$

$$\text{FS} = 62 + (-20) + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

3.3.4 Radiated Emission Test Data

Date of test: 16 July 2011

Operation: EUT on transmitting operation

Radiated Emissions

Pursuant to FCC 15.249: Emissions Requirement (30MHz-1GHz)

Polarization	Frequency (MHz)	Reading (dB μ V)	Correction Factor (dB)	Net at 3m (dB μ V/m)	QP Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	31.940	29.9	-9.4	20.5	40.0	-19.5
Horizontal	67.830	38.3	-20.0	18.3	40.0	-21.7
Horizontal	159.980	39.3	-17.0	22.3	43.5	-21.2
Vertical	143.490	30.8	-18.2	12.6	43.5	-30.9
Vertical	159.980	35.3	-17.0	18.3	43.5	-25.2
Vertical	191.990	31.4	-16.2	15.2	43.5	-28.3

Pursuant to FCC 15.249: Emissions Requirement(1GHz-25GHz)

Polarization	Frequency (MHz)	Reading (dB μ V)	Correction Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	2445.000	96.5	-9.8	86.7	114.0	-27.3
Horizontal	4881.667	54.9	-0.4	54.5	74.0	-19.5
Horizontal	9755.000	51.4	8.6	60.0	74.0	-14.0
Vertical	2445.000	97.8	-9.8	88.0	114.0	-26.0
Vertical	4881.667	58.3	-0.4	57.9	74.0	-16.1
Vertical	9755.000	58.1	8.6	66.7	74.0	-7.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Correction Factor (dB)	Average Factor (-dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	2445.000	96.5	-9.8	18.7	68.0	94.0	-26.0
Horizontal	4881.667	54.9	-0.4	18.7	35.8	54.0	-18.2
Horizontal	9755.000	51.4	8.6	18.7	41.3	54.0	-12.7
Vertical	2445.000	97.8	-9.8	18.7	69.3	94.0	-24.7
Vertical	4881.667	58.3	-0.4	18.7	39.2	54.0	-14.8
Vertical	9755.000	58.1	8.6	18.7	48.0	54.0	-6.0

Notes:

1. AT frequencies equal to or less than 1000MHz, quasi-peak detector was used, above 1000MHz, Peak detector was used.
2. All measurements were made at 3 meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.

3.3.5 Test Result

The data on the above test result table lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

According 15.249, the worst case radiated emission at 9755.000 MHz
Judgement: Passed by 6.0dB

3.4 Band Edges Measurement

3.4.1 Limited of the band edges measurement

Sec15.249:

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

(e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Sec15.215:

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20dB bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

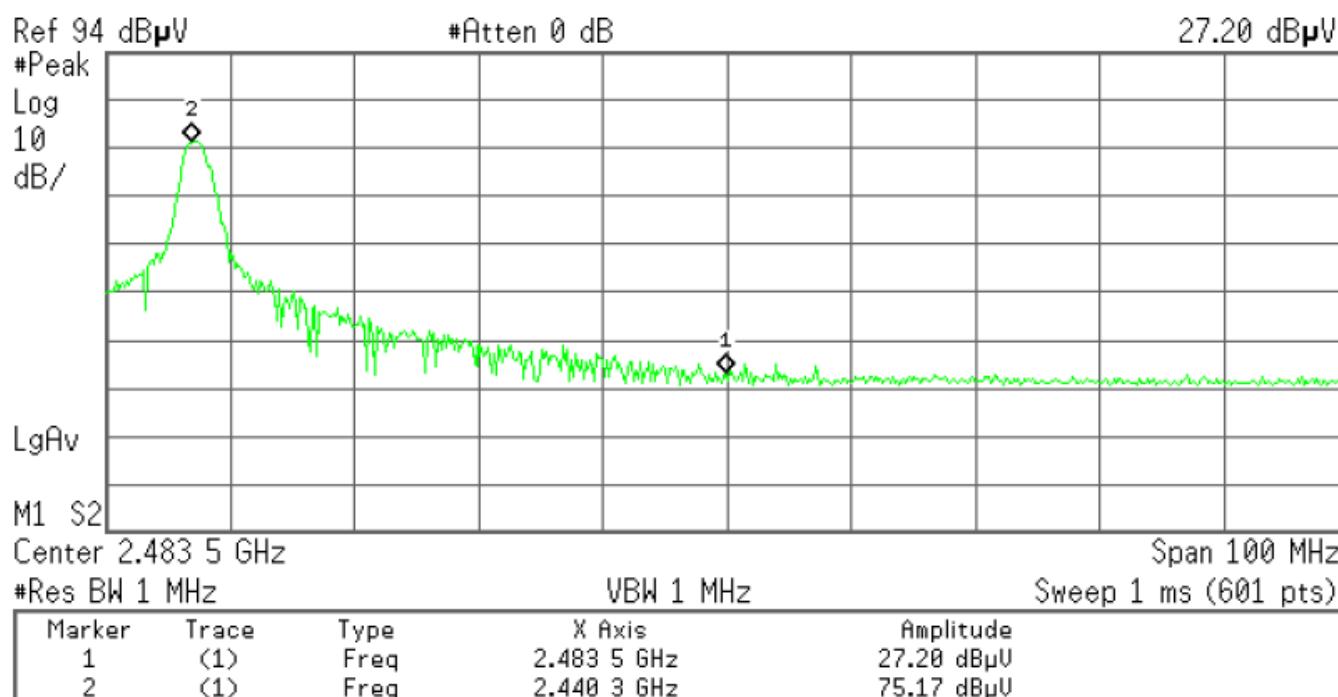
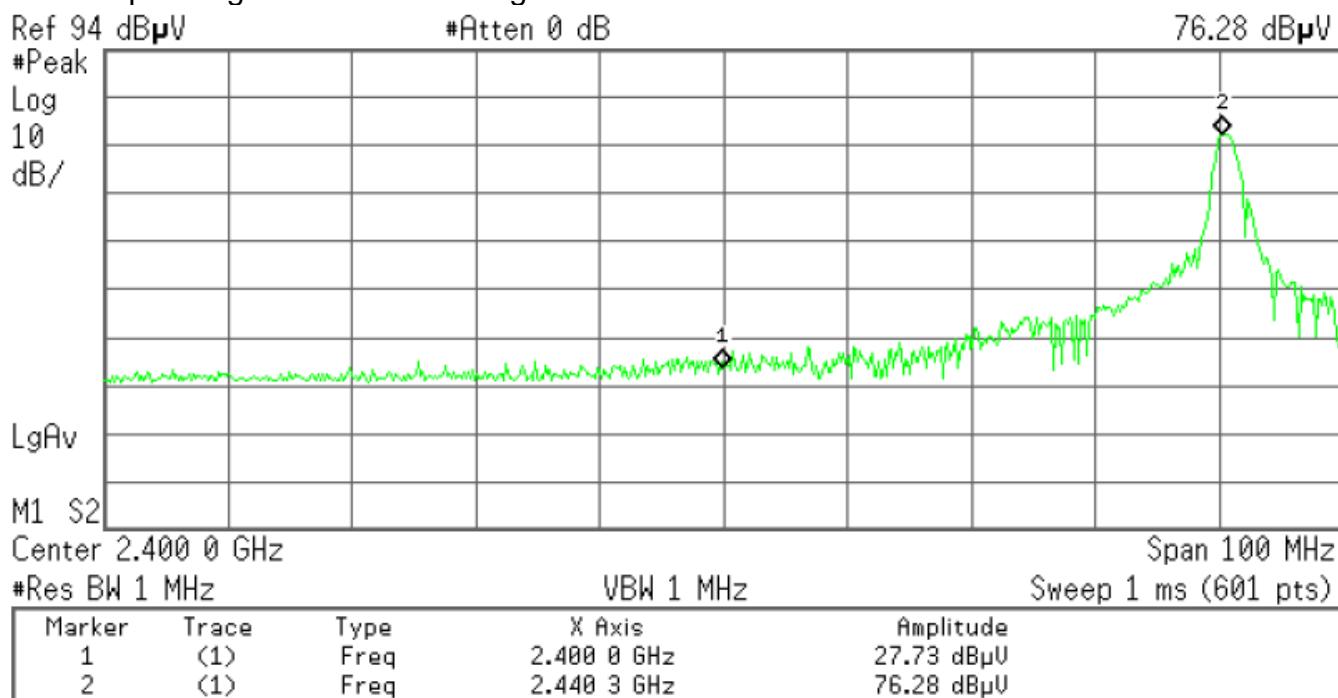
3.4.2 Test Setup

Refer to 1.4

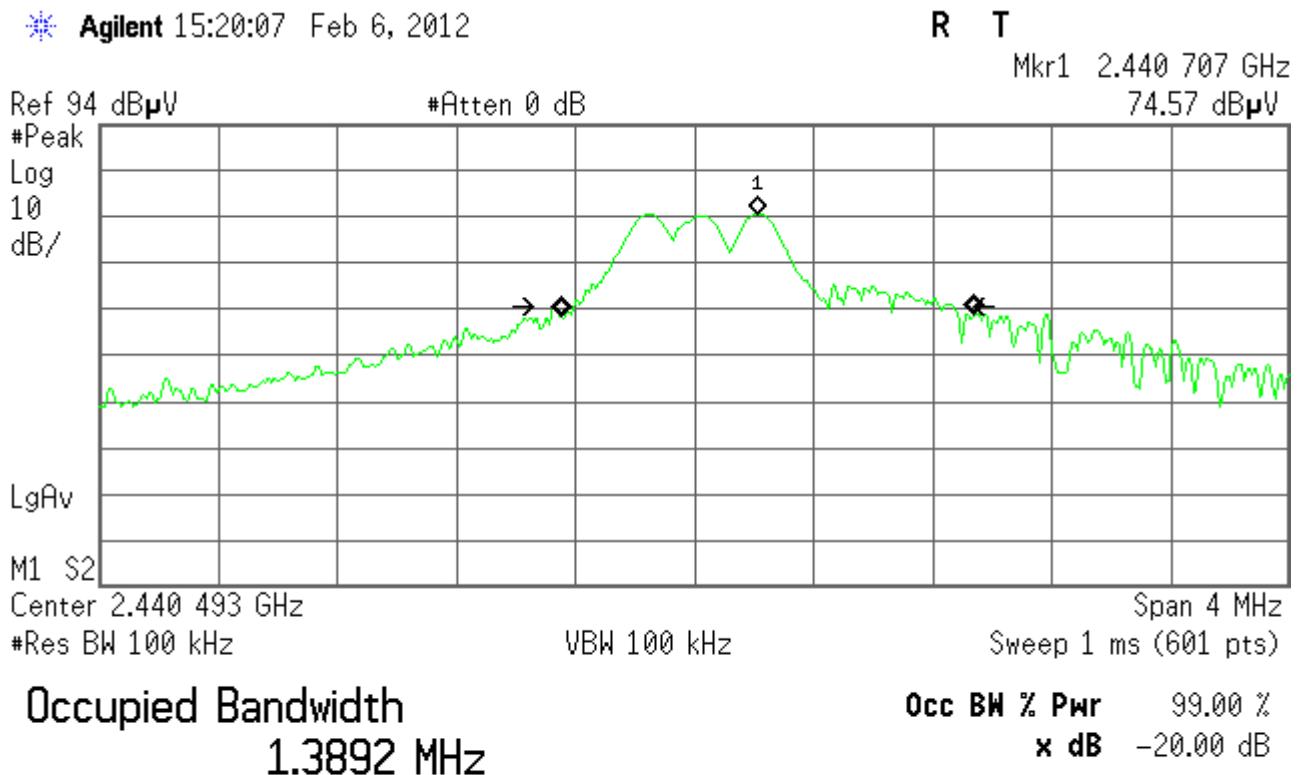
3.4.3 Test Plot

band edges

Operating mode: Transmitting



Modulation Bandwidth
Operating mode: Transmitting



Transmit Freq Error 248.123 kHz
x dB Bandwidth 1.344 MHz

3.4.4 Test Result

From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfills the requirement of 15.249(d).

Peak Measurement

Bandedge compliance is determined by applying marker-delta method, i.e (Bandedge Plot).

(i) Lower bandedge:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 88.0 \text{dB}\mu\text{v/m} - 48.6 \text{dB} \\ &= 39.4 \text{dB}\mu\text{v/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 69.3 \text{dB}\mu\text{v/m} - 48.6 \text{dB} \\ &= 20.7 \text{dB}\mu\text{v/m} \end{aligned}$$

(ii) Upper bandedge:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 88.0 \text{dB}\mu\text{v/m} - 48.0 \text{dB} \\ &= 40.0 \text{dB}\mu\text{v/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 69.3 \text{dB}\mu\text{v/m} - 48.0 \text{dB} \\ &= 21.3 \text{dB}\mu\text{v/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB μ v/m (Peak Limit) and 54dB μ v/m (Average Limit).

3.4.5 Transmitter Duty Cycle Calculation FCC Rule 15.35(b, c)

Averaging factor in dB = $20 \log (\text{duty cycle})$

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (1 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

A plot of the worst-case duty cycle as detected in this manner is shown below.

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 13.29ms
Effective period of the cycle = 1.542ms

DC = $1.542/13.29=0.1160$ or 11.60%

Therefore, the averaging factor is found by $20\lg 0.1160=-18.7$ dB

4. Appendix III - Document List

Exhibit type	File Description	Filename
Average factor	Average factor	Average factor.pdf
Bandwidth Plot	Bandwidth Plot	Bandwidth Plot.pdf
Block diagram of RF module	block diagram of RF module	block diagram of RF module.pdf
Block Diagram	Block Diagram	Block Diagram.pdf
Certification Agreement	Certification Agreement	Certification Agreement.pdf
Circuit diagram of RF Module	circuit diagram of RF Module	circuit diagram of RF Module.pdf
Circuit Diagram	Circuit Diagram	Circuit Diagram.pdf
External photos	External photos	External photos.pdf
Form-731	Form-731	Form-731.doc
Internal photos	internal photos	internal photos.pdf
Label and Location	Label and Location	Label and Location.pdf
Letter of Agency	Letter of Agency	Letter of Agency.pdf
Technical description	Technical description	Technical description.pdf
Test Report-GZ11100388-1	Test Report-GZ11100388-1	Test Report-GZ11100388-1.pdf
Test Setup Photos(Conducted Emission)	Test Setup Photos(Conducted Emission)	Test Setup Photos(Conducted Emission).pdf
Test Setup Photos(Radiated Emission)	Test Setup Photos(Radiated Emission)	Test Setup Photos(Radiated Emission).pdf
User Manual	User Manual	User Manual.pdf

----- End of Report -----