

Breathometer, Inc.

TEST REPORT FOR

**Broadcom Bluetooth Module
Model: BCM20732S**

Tested To The Following Standard:

FCC Part 15 Subpart C Section(s)

**15.247
(DTS 2400-2483.5 MHz)**

Report No.: 98100-7

Date of issue: March 2, 2016



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Breathometer, Inc.
863 Mitten Road
Burlingame, CA 94010

REPORT PREPARED BY:

Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

REPRESENTATIVE: Larry Arne
Customer Reference Number: 00041

Project Number: 98100

DATE OF EQUIPMENT RECEIPT:

February 18, 2016

DATE(S) OF TESTING:

February 18-23, 2016

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
1120 Fulton Place
Fremont, CA 94539

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.00

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	A-0149

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (DTS)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	NP
15.247(b)(3)	Output Power	NA	NP1
15.247(e)	Power Spectral Density	NA	NP
15.247(d)	RF Conducted Emissions & Band Edge	NA	NA2
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable

NA1 = Not Applicable because the EUT is operated by an internal battery.

NA2 = Not Applicable because the EUT has an integral antenna.

NP = CKC Laboratories was not contracted to perform test because this evaluation is for a PCII of a limited modular device installed in a specific host.

NP1 = CKC Laboratories was not contracted to perform test because the RF power setting is identical to that which was used during the original certification for FCC ID: QDS-BRCM1078.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Broadcom Bluetooth Module	Breathometer, Inc.	BCM20732S	Unknown

Support Equipment:

Device	Manufacturer	Model #	S/N
Mint	Breathometer, Inc.	Mint 1.0	33B1900111

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	BLE 4.0
Operating Frequency Range:	2402-2480MHz
Modulation Type(s):	FSK
Maximum Duty Cycle:	Greater than 98%
Number of TX Chains:	40
Antenna Type(s) and Gain:	PCB -1.5dBi
Beamforming Type:	NA
Antenna Connection Type:	Integral
Nominal Input Voltage:	3.3VDC
Firmware / Software used for Test:	Firmware Version EVT

FCC Part 15 Subpart C

15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Breathometer, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **98100** Date: 2/18/2016
 Test Type: **Radiated Scan** Time: 13:54:05
 Tested By: Hieu Song Nguyenpham Sequence#: 34
 Software: EMITest 5.03.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 9kHz to 1000MHz

Firmware Used: Version EVT
 Temperature: 19.6° C
 Humidity: 43 %
 Atmospheric Pressure: 101.8 kPa

Highest Generation Frequency: 2.48GHz
 Method: ANSI C63.10 2013
 Transmitting Frequencies: 2402,2440 and 2480MHz

9 kHz -150 kHz; RBW=200 Hz,VBW=200 Hz;
 150 kHz-30 MHz; RBW=9 kHz,VBW=9 kHz;
 30 MHz-1000 MHz; RBW=120 kHz,VBW=120 kHz,
 1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.

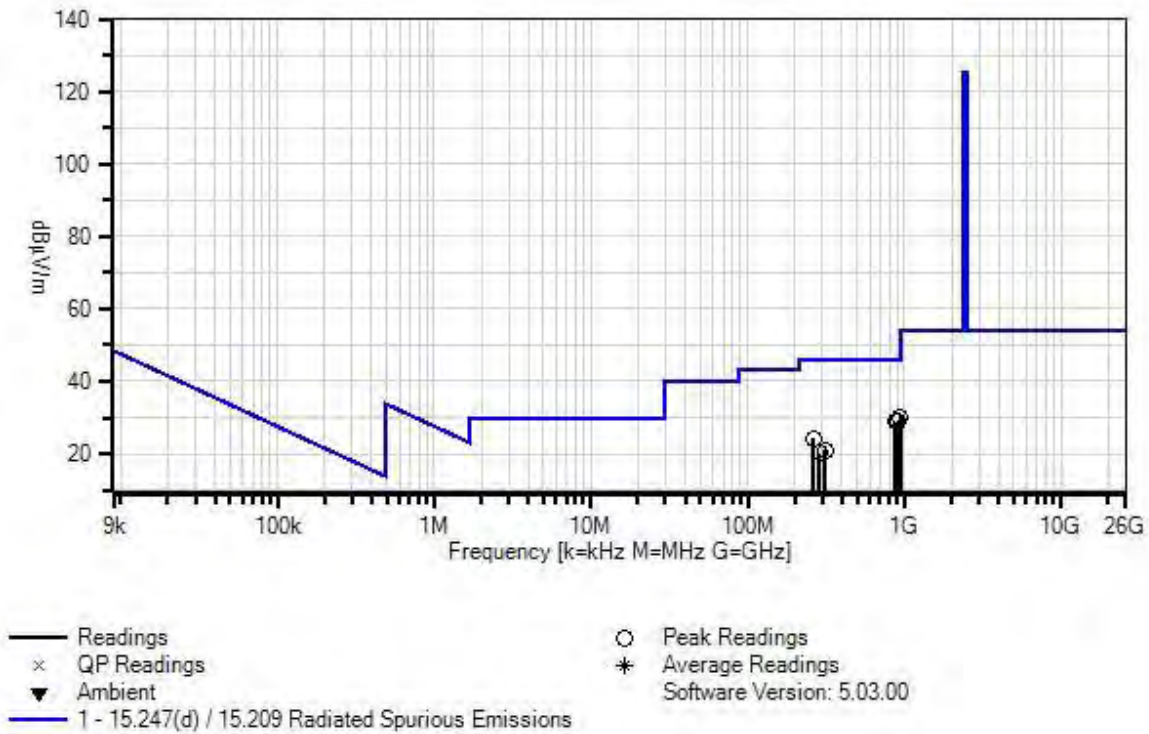
The EUT is a limited modular approved module. It is installed in a specific host and placed on a non-conducted table. The device is operated by an internal battery at 3.3VDC. The EUT is set in continuously transmitting as intended.

This evaluation is for PCII of a limited modular device installed in specific host. The RF power setting is identical to that was used during original certified. FCCID: QDS-BRCM1078.

X- axis is the worst orthogonal

Low Channel

Breathometer, Inc WO#: 98100 Sequence#: 34 Date: 2/18/2016
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T3	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T4	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T5	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	941.960M	28.7	-27.6 +1.4	+23.8	+3.2	+0.7	+0.0	30.2	46.0	-15.8	Vert
2	913.005M	28.2	-27.7 +1.4	+23.4	+3.2	+0.7	+0.0	29.2	46.0	-16.8	Vert
3	873.245M	28.6	-27.8 +1.4	+22.9	+3.1	+0.6	+0.0	28.8	46.0	-17.2	Vert
4	263.973M	35.7	-27.0 +0.6	+12.9	+1.6	+0.3	+0.0	24.1	46.0	-21.9	Horiz
5	311.988M	31.6	-27.1 +0.7	+13.7	+1.7	+0.4	+0.0	21.0	46.0	-25.0	Horiz
6	288.002M	31.5	-27.0 +0.7	+13.2	+1.6	+0.3	+0.0	20.3	46.0	-25.7	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Breathometer, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **98100** Date: 2/18/2016
 Test Type: **Radiated Scan** Time: 09:20:24
 Tested By: Hieu Song Nguyenpham Sequence#: 25
 Software: EMITest 5.03.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

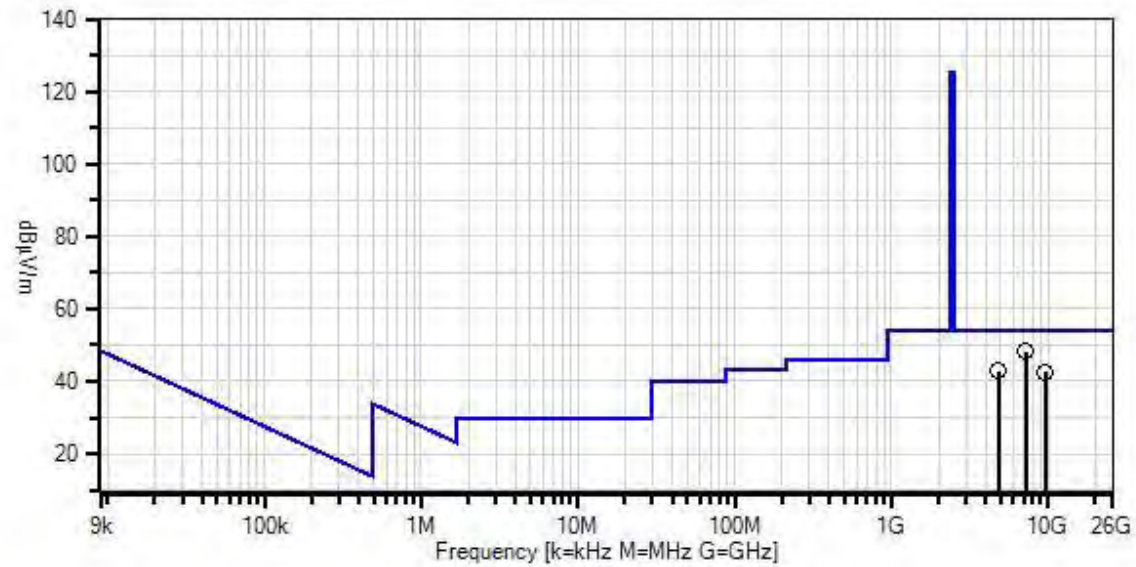
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

<p>Radiated Spurious Emission Frequency Range: 1000MHz to 25000MHz</p> <p>Firmware Used: Version EVT Temperature: 19.6°C Humidity: 43 % Atmospheric Pressure: 101.8 kPa</p> <p>Highest Generation Frequency: 2.48GHz Method: ANSI C63.10 2013 Transmitting Frequencies: 2402,2440 and 2480MHz</p> <p>9 kHz -150 kHz; RBW=200 Hz,VBW=200 Hz; 150 kHz-30 MHz; RBW=9 kHz,VBW=9 kHz; 30 MHz-1000 MHz; RBW=120 kHz,VBW=120 kHz, 1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.</p> <p>The EUT is a limited modular approved module. It is installed in a specific host and placed on a non-conducted table. The device is operated by an internal battery at 3.3VDC. The EUT is set in continuously transmitting as intended.</p> <p>This evaluation is for PCII of a limited modular device installed in specific host. The RF power setting is identical to that was used during original certified. FCCID: QDS-BRCM1078.</p> <p>X- axis is the worst orthogonal</p> <p>Low Channel</p>

Breathometer, Inc WO#: 98100 Sequence#: 25 Date: 2/18/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



— Readings
× QP Readings
▼ Ambient
— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
* Average Readings
Software Version: 5.03.00

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
T2	AN03302	Cable	32026-29094K-29094K-72TC	1/29/2016	1/29/2018
T3	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018
T4	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP00929	Cable	various	1/25/2016	1/25/2018
	ANP06126	Cable	32022-29094K-29094K-168TC	3/18/2015	3/18/2017
	ANP06138	Cable	32022-29094K-29094K-72TC	3/18/2015	3/18/2017
T5	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	1/18/2016	1/18/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
T6	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	T5	T6							
			dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	7206.763M	63.8	+34.1 +0.3	+2.2 +1.0	+5.0	-58.3	+0.0	48.1	54.0	-5.9	Horiz
2	4804.410M	63.2	+30.8 +0.3	+1.8 +0.8	+3.8	-57.8	+0.0	42.9	54.0	-11.1	Horiz
3	9608.085M	55.5	+34.8 +0.3	+2.6 +1.1	+5.4	-57.2	+0.0	42.5	54.0	-11.5	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Breathometer, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **98100** Date: 2/18/2016
 Test Type: **Radiated Scan** Time: 14:31:19
 Tested By: Hieu Song Nguyenpham Sequence#: 37
 Software: EMITest 5.03.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 9kHz to 1000MHz

Firmware Used: Version EVT
 Temperature: 19.6°C
 Humidity: 43 %
 Atmospheric Pressure: 101.8 kPa

Highest Generation Frequency: 2.48GHz
 Method: ANSI C63.10 2013
 Transmitting Frequencies: 2402,2440 and 2480MHz

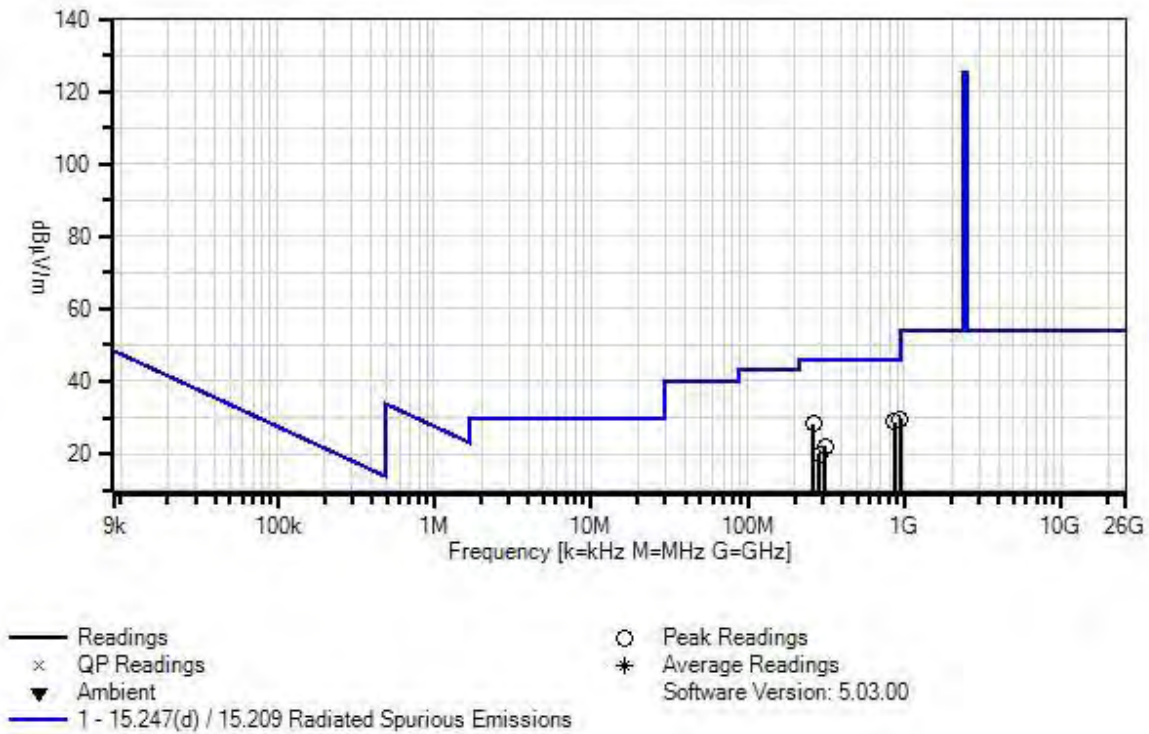
9 kHz -150 kHz; RBW=200 Hz,VBW=200 Hz;
 150 kHz-30 MHz; RBW=9 kHz,VBW=9 kHz;
 30 MHz-1000 MHz; RBW=120 kHz,VBW=120 kHz,
 1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.

The EUT is a limited modular approved module. It is installed in a specific host and placed on a non-conducted table. The device is operated by an internal battery at 3.3VDC. The EUT is set in continuously transmitting as intended.

This evaluation is for PCII of a limited modular device installed in specific host. The RF power setting is identical to that was used during original certified. FCCID: QDS-BRCM1078.

X- axis is the worst orthogonal
Middle Channel

Breathometer, Inc WO#: 98100 Sequence#: 37 Date: 2/18/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T3	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T4	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T5	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	936.364M	28.1	-27.6 +1.4	+23.7	+3.2	+0.7	+0.0	29.5	46.0	-16.5	Vert
2	867.473M	28.6	-27.8 +1.4	+22.8	+3.1	+0.6	+0.0	28.7	46.0	-17.3	Vert
3	264.000M	39.8	-27.0 +0.6	+12.9	+1.6	+0.3	+0.0	28.2	46.0	-17.8	Horiz
4	311.986M	32.7	-27.1 +0.7	+13.7	+1.7	+0.4	+0.0	22.1	46.0	-23.9	Horiz
5	287.978M	31.2	-27.0 +0.7	+13.2	+1.6	+0.3	+0.0	20.0	46.0	-26.0	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Breathometer, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **98100** Date: 2/18/2016
 Test Type: **Radiated Scan** Time: 09:50:08
 Tested By: Hieu Song Nguyenpham Sequence#: 28
 Software: EMITest 5.03.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 1000MHz to 25000MHz

Firmware Used: Version EVT
 Temperature: 19.6° C
 Humidity: 43 %
 Atmospheric Pressure: 101.8 kPa

Highest Generation Frequency: 2.48GHz
 Method: ANSI C63.10 2013
 Transmitting Frequencies: 2402,2440 and 2480MHz

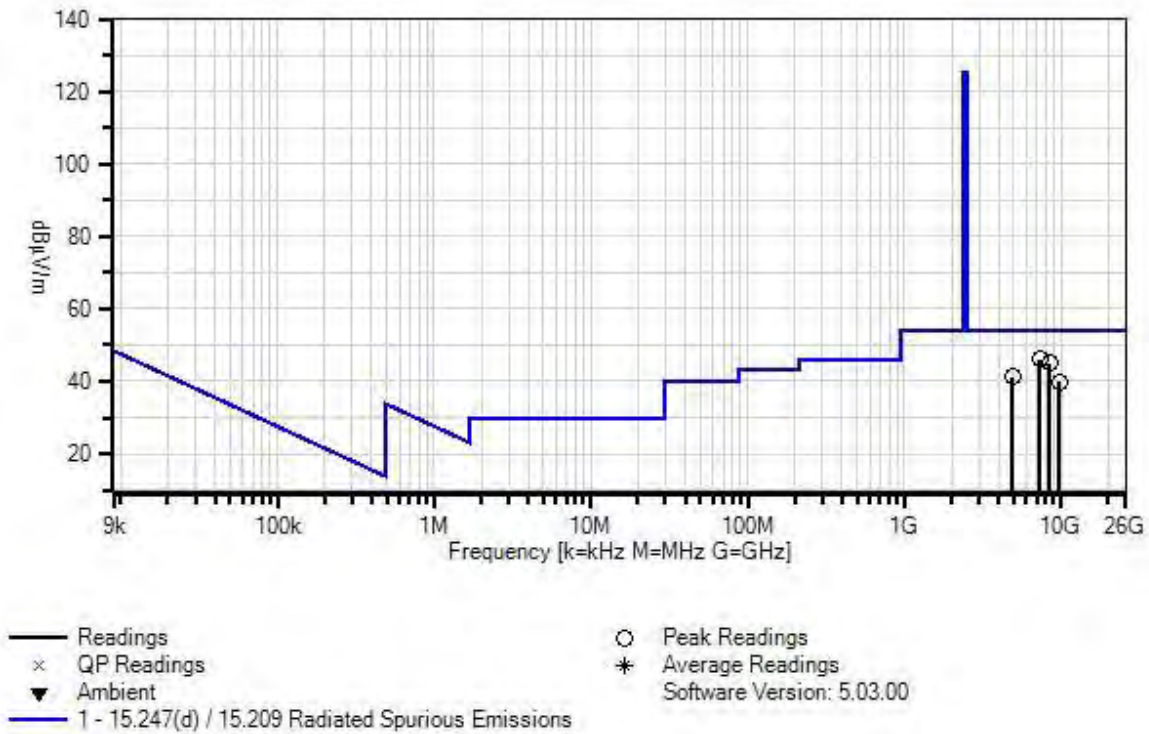
9 kHz -150 kHz; RBW=200 Hz,VBW=200 Hz;
 150 kHz-30 MHz; RBW=9 kHz,VBW=9 kHz;
 30 MHz-1000 MHz; RBW=120 kHz,VBW=120 kHz,
 1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.

The EUT is a limited modular approved module. It is installed in a specific host and placed on a non-conducted table. The device is operated by an internal battery at 3.3VDC. The EUT is set in continuously transmitting as intended.

This evaluation is for PCH of a limited modular device installed in specific host. The RF power setting is identical to that was used during original certified. FCCID: QDS-BRCM1078.

X- axis is the worst orthogonal
Middle Channel

Breathometer, Inc WO#: 98100 Sequence#: 28 Date: 2/18/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
T2	AN03302	Cable	32026-29094K-29094K-72TC	1/29/2016	1/29/2018
T3	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018
T4	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP00929	Cable	various	1/25/2016	1/25/2018
	ANP06126	Cable	32022-29094K-29094K-168TC	3/18/2015	3/18/2017
	ANP06138	Cable	32022-29094K-29094K-72TC	3/18/2015	3/18/2017
T5	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	1/18/2016	1/18/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
T6	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	T5	T6							
			dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	7326.322M	61.5	+34.3 +0.3	+2.3 +1.0	+5.0	-58.3	+0.0	46.1	54.0	-7.9	Horiz
2	8462.457M	56.5	+36.0 +0.3	+2.4 +1.0	+5.2	-56.4	+0.0	45.0	54.0	-9.0	Horiz
3	4884.570M	61.2	+31.0 +0.3	+1.8 +0.8	+3.8	-57.6	+0.0	41.3	54.0	-12.7	Horiz
4	9762.640M	53.0	+34.9 +0.3	+2.6 +1.1	+5.6	-57.6	+0.0	39.9	54.0	-14.1	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Breathometer, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **98100** Date: 2/18/2016
 Test Type: **Radiated Scan** Time: 15:20:24
 Tested By: Hieu Song Nguyenpham Sequence#: 40
 Software: EMITest 5.03.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

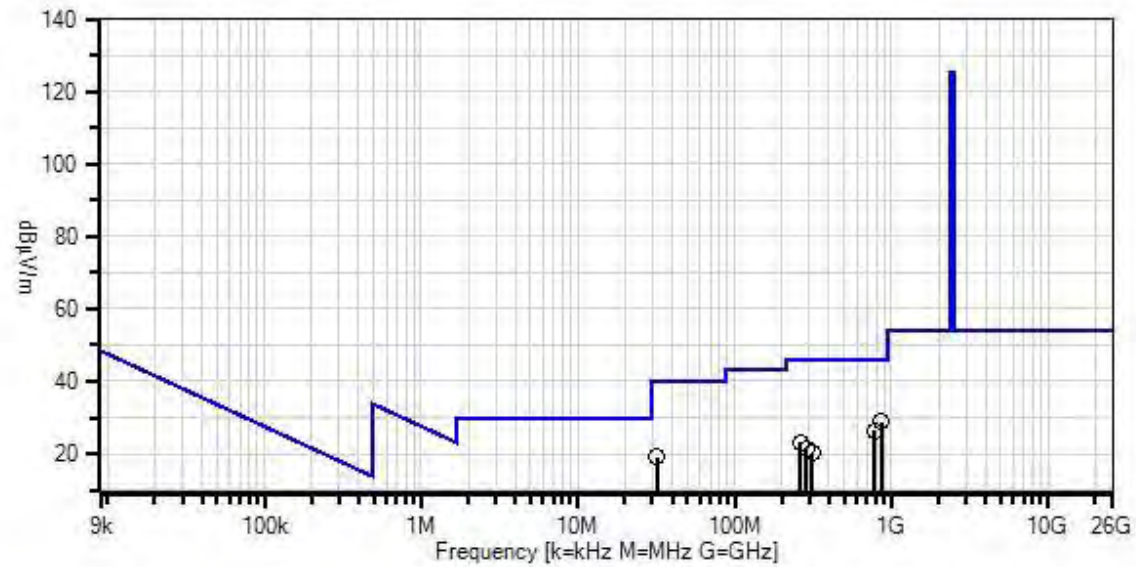
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

<p>Radiated Spurious Emission Frequency Range: 9kHz to 1000MHz</p> <p>Firmware Used: Version EVT Temperature: 19.6°C Humidity: 43 % Atmospheric Pressure: 101.8 kPa</p> <p>Highest Generation Frequency: 2.48GHz Method: ANSI C63.10 2013 Transmitting Frequencies: 2402,2440 and 2480MHz</p> <p>9 kHz -150 kHz; RBW=200 Hz,VBW=200 Hz; 150 kHz-30 MHz; RBW=9 kHz,VBW=9 kHz; 30 MHz-1000 MHz; RBW=120 kHz,VBW=120 kHz, 1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.</p> <p>The EUT is a limited modular approved module. It is installed in a specific host and placed on a non-conducted table. The device is operated by an internal battery at 3.3VDC. The EUT is set in continuously transmitting as intended.</p> <p>This evaluation is for PCII of a limited modular device installed in specific host. The RF power setting is identical to that was used during original certified. FCCID: QDS-BRCM1078.</p> <p>X- axis is the worst orthogonal</p> <p>High Channel</p>
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Breathometer, Inc WO#: 98100 Sequence#: 40 Date: 2/18/2016
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



— Readings
 × QP Readings
 ▼ Ambient
 — 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
 * Average Readings
 Software Version: 5.03.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T3	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T4	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T5	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	866.889M	28.6	-27.8 +1.4	+22.8	+3.1	+0.6	+0.0	28.7	46.0	-17.3	Vert
2	776.980M	28.0	-28.0 +1.3	+21.6	+2.9	+0.7	+0.0	26.5	46.0	-19.5	Vert
3	31.810M	28.2	-28.0 +0.2	+18.0	+0.5	+0.1	+0.0	19.0	40.0	-21.0	Vert
4	264.000M	34.7	-27.0 +0.6	+12.9	+1.6	+0.3	+0.0	23.1	46.0	-22.9	Horiz
5	288.000M	32.5	-27.0 +0.7	+13.2	+1.6	+0.3	+0.0	21.3	46.0	-24.7	Horiz
6	312.000M	30.7	-27.1 +0.7	+13.7	+1.7	+0.4	+0.0	20.1	46.0	-25.9	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Breathometer, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **98100** Date: 2/18/2016
 Test Type: **Radiated Scan** Time: 10:14:12
 Tested By: Hieu Song Nguyenpham Sequence#: 31
 Software: EMITest 5.03.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

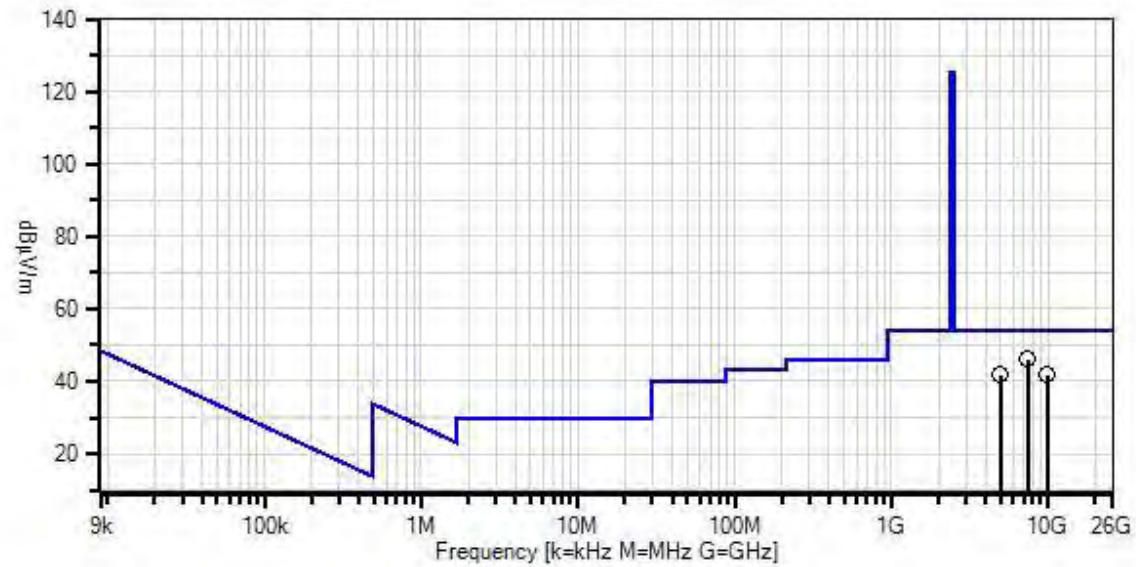
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

<p>Radiated Spurious Emission Frequency Range: 1000MHz to 25000MHz</p> <p>Firmware Used: Version EVT Temperature: 19.6°C Humidity: 43 % Atmospheric Pressure: 101.8 kPa</p> <p>Highest Generation Frequency: 2.48GHz Method: ANSI C63.10 2013 Transmitting Frequencies: 2402,2440 and 2480MHz</p> <p>9 kHz -150 kHz; RBW=200 Hz,VBW=200 Hz; 150 kHz-30 MHz; RBW=9 kHz,VBW=9 kHz; 30 MHz-1000 MHz; RBW=120 kHz,VBW=120 kHz, 1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.</p> <p>The EUT is a limited modular approved module. It is installed in a specific host and placed on a non-conducted table. The device is operated by an internal battery at 3.3VDC. The EUT is set in continuously transmitting as intended.</p> <p>This evaluation is for PCII of a limited modular device installed in specific host. The RF power setting is identical to that was used during original certified. FCCID: QDS-BRCM1078.</p> <p>X- axis is the worst orthogonal</p> <p>High Channel</p>
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Breathometer, Inc WO#: 98100 Sequence#: 31 Date: 2/18/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



— Readings
× QP Readings
▼ Ambient
— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
* Average Readings
Software Version: 5.03.00

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
T2	AN03302	Cable	32026-29094K-29094K-72TC	1/29/2016	1/29/2018
T3	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018
T4	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP00929	Cable	various	1/25/2016	1/25/2018
	ANP06126	Cable	32022-29094K-29094K-168TC	3/18/2015	3/18/2017
	ANP06138	Cable	32022-29094K-29094K-72TC	3/18/2015	3/18/2017
T5	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	1/18/2016	1/18/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
T6	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	T5 dB	T6 dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	7440.948M	61.1	+34.4 +0.3	+2.3 +1.0	+5.1	-58.2	+0.0	46.0	54.0	-8.0	Horiz
2	4960.410M	61.3	+31.1 +0.3	+1.8 +0.8	+3.8	-57.3	+0.0	41.8	54.0	-12.2	Horiz
3	9920.215M	54.7	+35.0 +0.4	+2.6 +1.1	+5.7	-57.7	+0.0	41.8	54.0	-12.2	Horiz

Band Edge Summary					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2400	FSK	Integral	42.7	<54	Pass
2483.5	FSK	Integral	41.6	<54	Pass

Test Setup / Conditions

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Breathometer, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **98100** Date: 2/23/2016
 Test Type: **Radiated Scan** Time: 09:08:44
 Tested By: Hieu Song Nguyenpham Sequence#: 24
 Software: EMITest 5.03.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Firmware Used: Version EVT

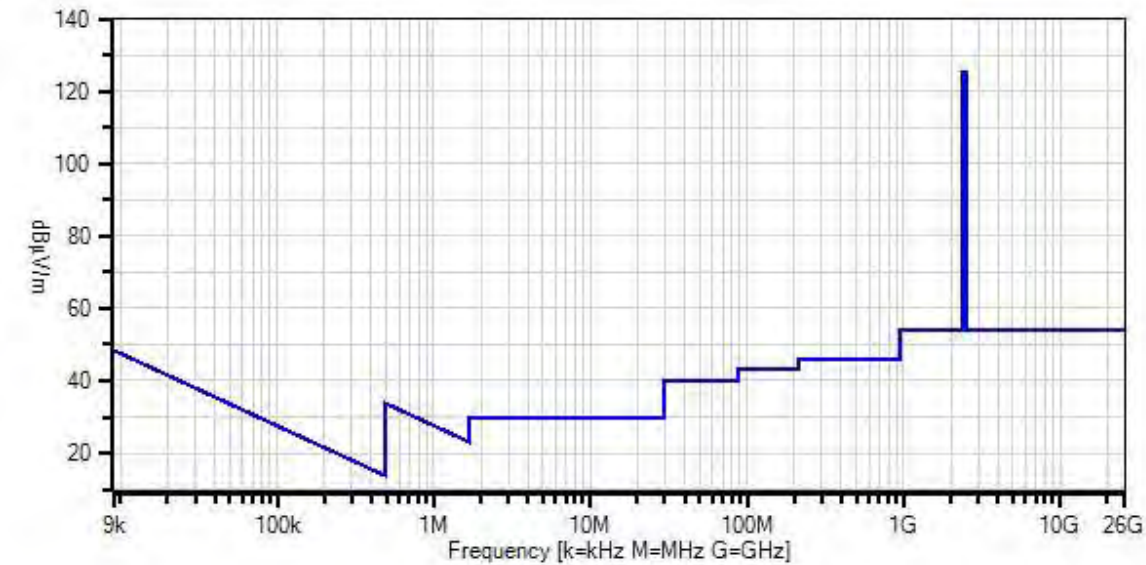
 Temperature: 19.6° C
 Humidity: 43 %
 Atmospheric Pressure: 101.8 kPa

 Highest Generation Frequency: 2.48GHz
 Method: ANSI C63.4 2014

 The EUT is a limited modular approved module. It is installed in a specific host and placed on a non-conducted table. The device is operated by an internal battery at 3.3VDC. The EUT is set in continuously transmitting as intended.
 This evaluation is for PCII of a limited modular device installed in specific host. The RF power setting is identical to that was used during original certified. FCCID: QDS-BRCM1078.

 X- axis is the worst orthogonal

Breathometer, Inc WO#: 98100 Sequence#: 24 Date: 2/23/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters

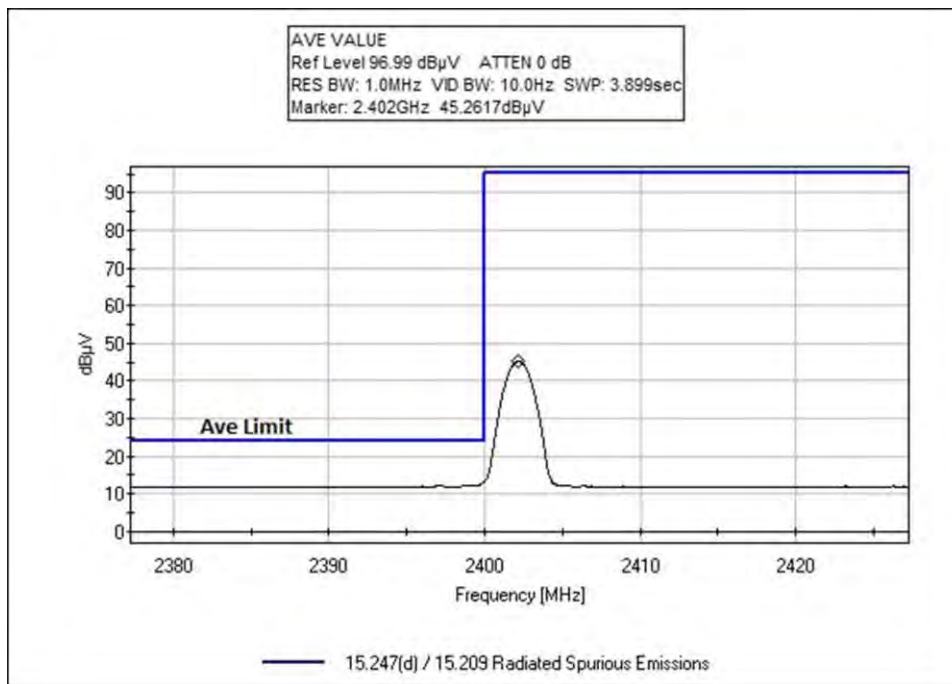
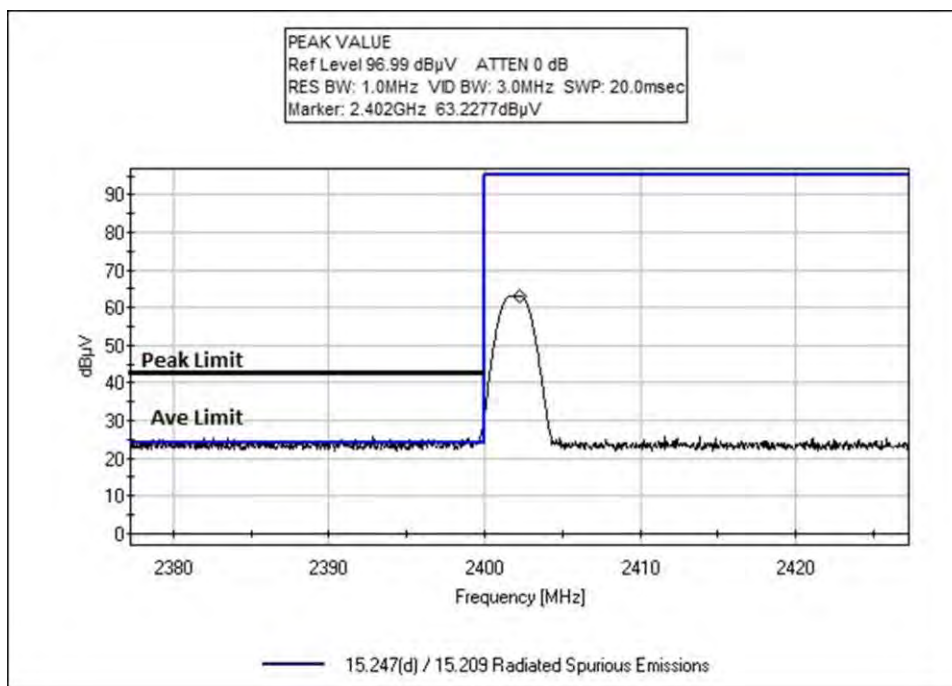


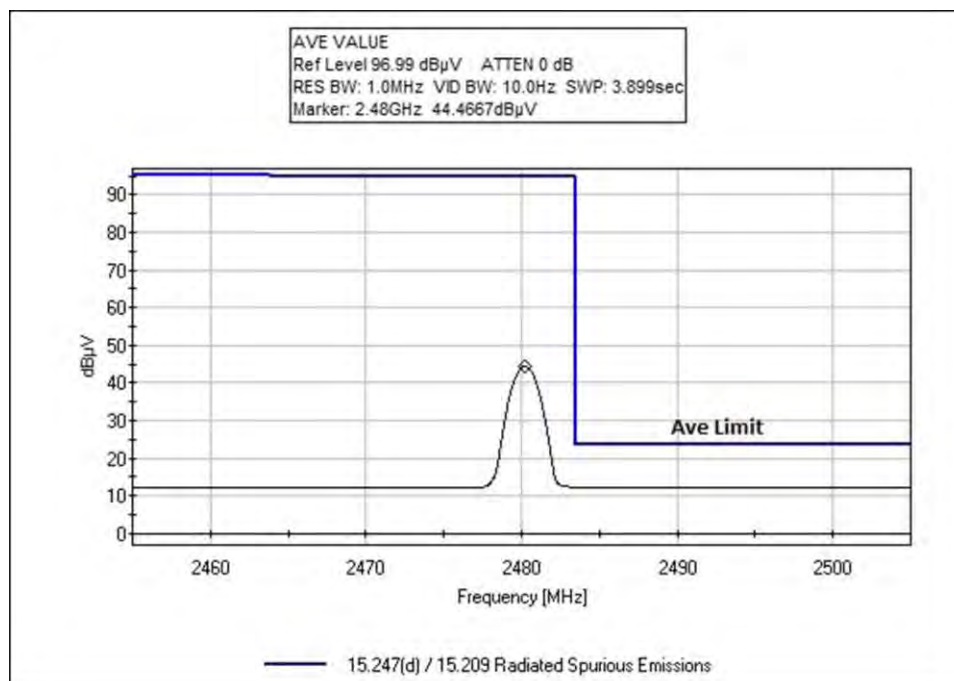
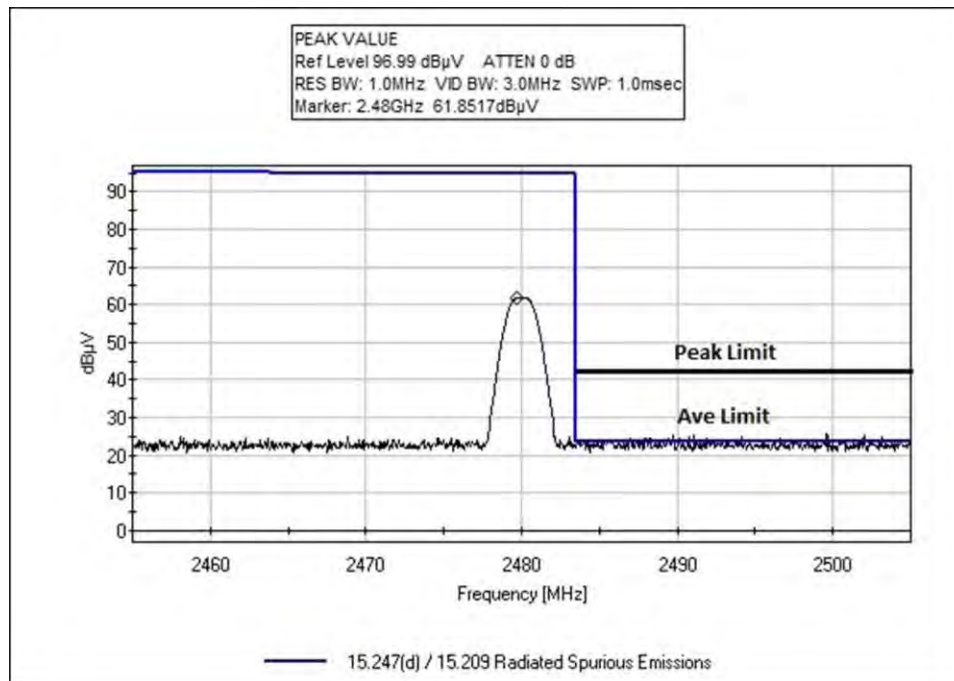
— Readings
× QP Readings
▼ Ambient
— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions
○ Peak Readings
* Average Readings
Software Version: 5.03.00

Test Equipment:

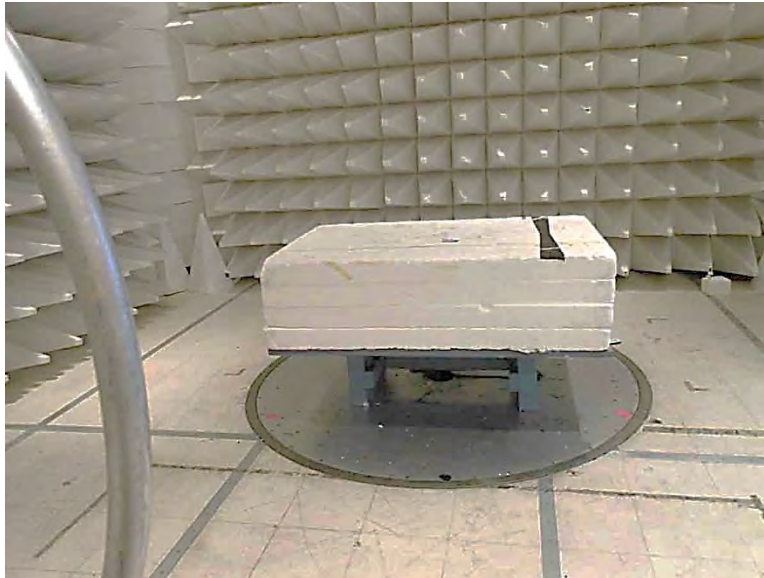
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
	AN03302	Cable	32026-29094K-29094K-72TC	1/29/2016	1/29/2018
	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018

Band Edge Plots

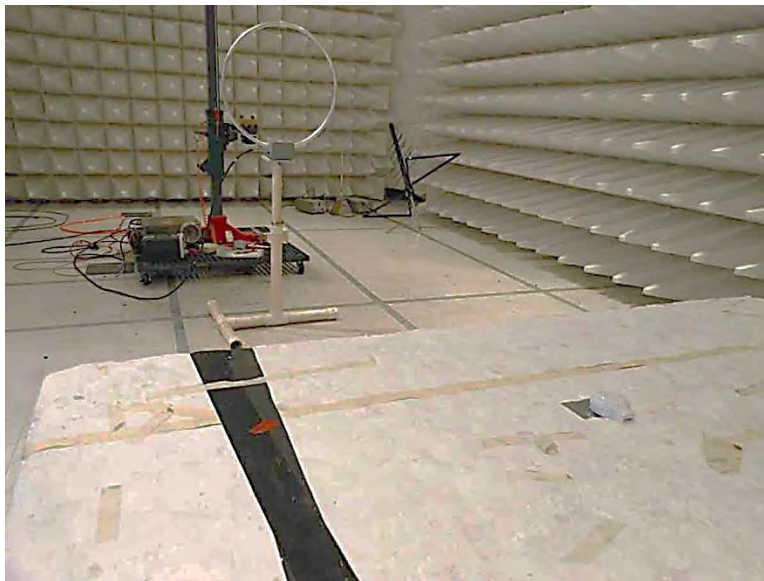




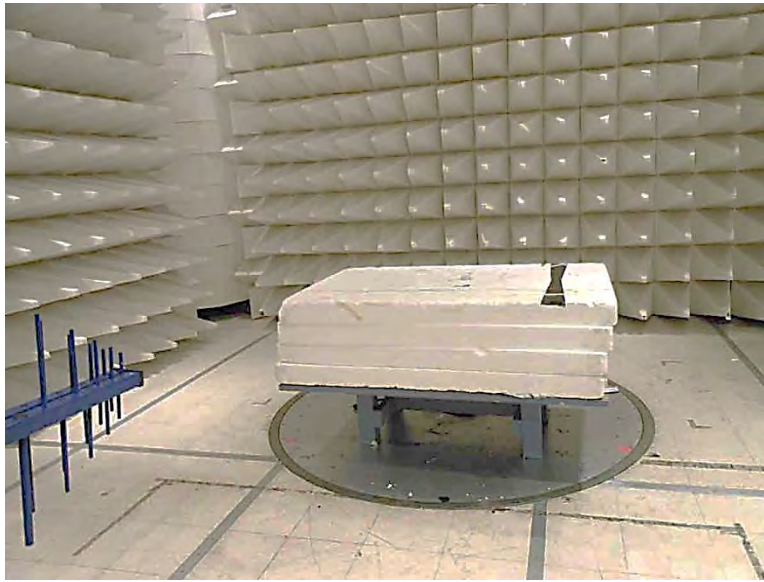
Test Setup Photos



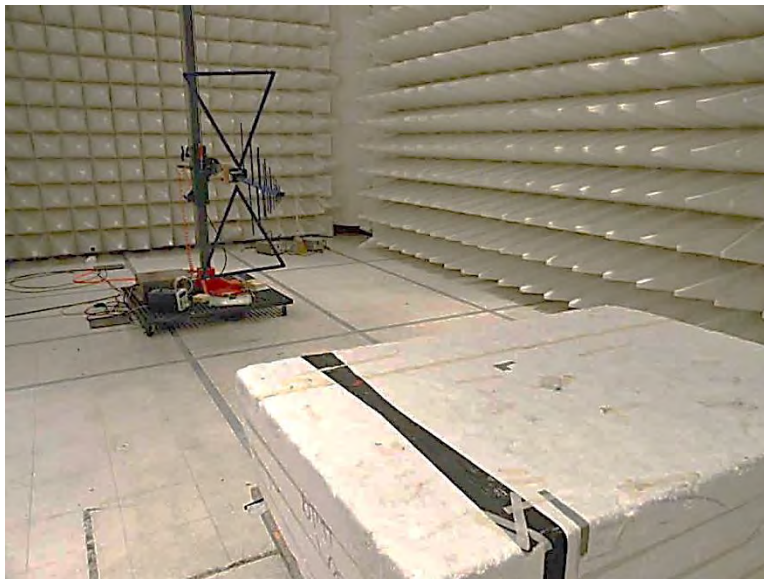
9kHz – 30MHz



9kHz – 30MHz



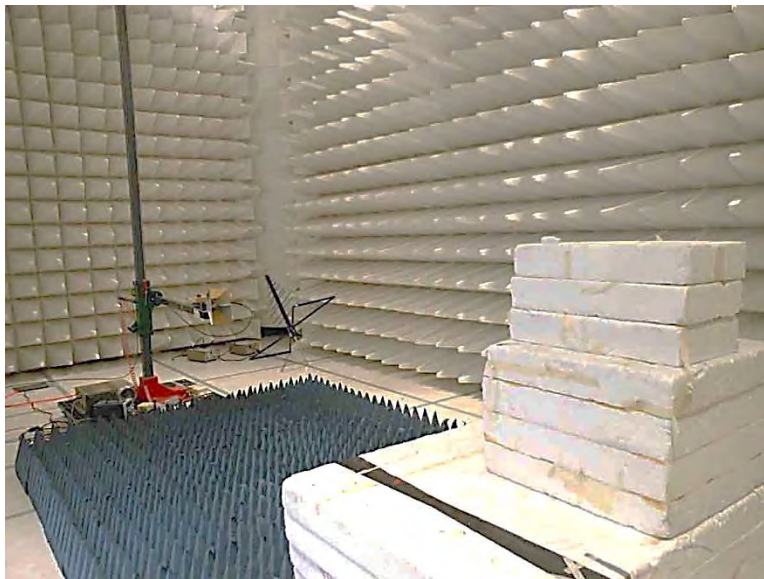
30MHz – 1GHz



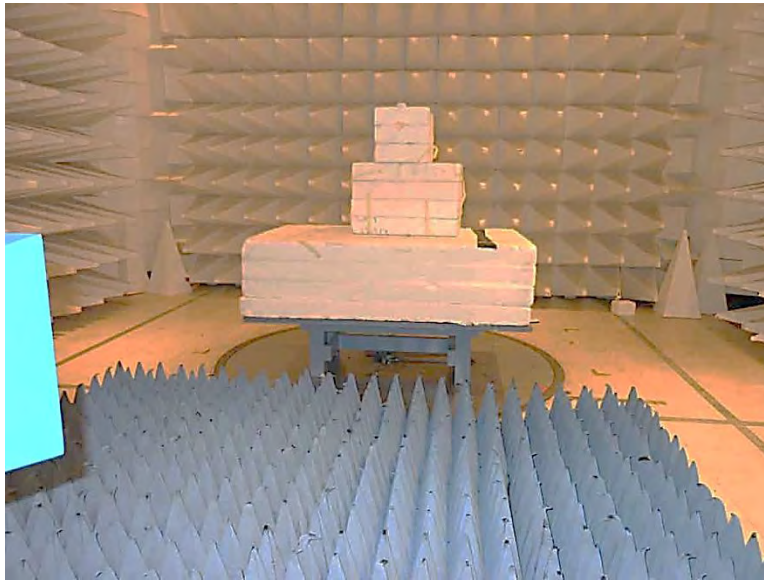
30MHz – 1GHz



1 – 12GHz



1 – 12GHz



12 – 25GHz



12 – 25GHz

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on the limit value subtracting the corrected measured value; a negative margin represents a measurement less than the limit while a positive margin represents a measurement exceeding the limit.

SAMPLE CALCULATIONS		
	Meter reading	($\text{dB}\mu\text{V}$)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.