

# Mason Target Systems

## ADDENDUM TO TEST REPORT 97807-6

**Base Station  
Model: 100LR01A**

**Tested To The Following Standards:**

**FCC Part 15 Subpart C Section(s)**

**15.207 & 15.249**

**Report No.: 97807-6A**

**Date of issue: April 8, 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:**

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Representative: Colin Parker

**REPORT PREPARED BY:**

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Mariposa, CA 95338

Project Number: 97807

**DATE OF EQUIPMENT RECEIPT:**

February 9, 2016

**DATE(S) OF TESTING:**

February 9 – March 21, 2016

### Revision History

**Original:** Testing of Base Station, Model: 100LR01A to FCC Part 15 Subpart C Section(s) 15.207 & 15.249

**Addendum A:** To correct the test setup photos in sections OBW, Fundamental and Field Strength of Spurious Emissions (over 1GHz).

### 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	5.03.02

## 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 - 15.249

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	Mod. #1	Pass
15.249(a)	Field Strength of Fundamental	Mod. #1	Pass
15.249(a)	Field Strength of Spurious Emissions	Mod. #1	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

### Modifications During Testing

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

Summary of Conditions
Modification #1: Change C6= 1.8pF and L3 =3.3nH

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
Base Station	Mason Target Systems	100LR01A	C77D00010F0C1702

#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
AC/DC power adapter for Base Station	Apple	A1385	NA
Laptop	Lenovo	80JH	PF0AHQT7

## General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	QPSK
Maximum Duty Cycle:	100%
Antenna Type(s) and Gain:	Surface Mount -1dBi
Antenna Connection Type:	Integral
Nominal Input Voltage:	5VDC
Software used for Test:	Nordic Semiconductor's Direct Test Mode, via Mason Custom Application 1.0

## FCC Part 15 Subpart C

### 15.215(c) Occupied Bandwidth (20dB BW)

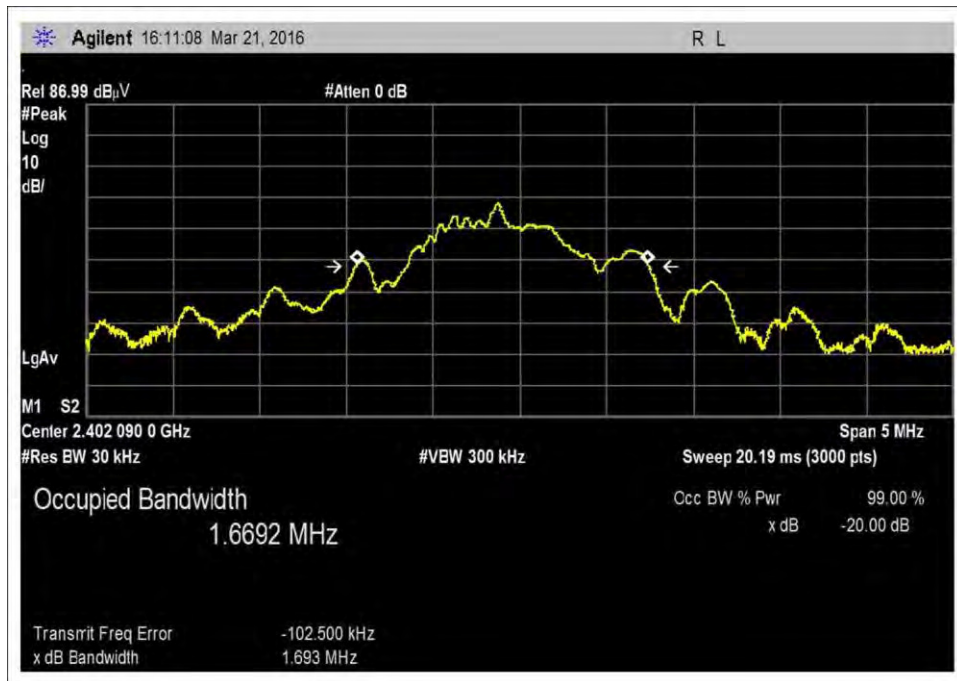
Test Setup/Conditions			
Test Location:	Fremont Lab C3	Test Engineer:	Hieu Song Nguyenpham
Test Method:	ANSI C63.10 (2013)	Test Date(s):	3/21/2016
Configuration:	1		
Test Setup:	<p>The EUT is placed on a non-conducted table. It is operated continuously transmitting or receiving as intended.</p> <p>A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.</p>		
Modification	Modification #1 was in place during testing.		

Environmental Conditions			
Temperature (°C)	21.3	Relative Humidity (%):	43

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02113	Horn Antenna	EMC Test Systems	3115	2/3/2015	2/3/2017
P01210	Cable	Andrews	FSJ1P-50A-4A	1/15/2015	1/15/2017
03302	Cable	Astrolab	32026-29094K-29094K-72TC	1/29/2016	1/29/2018
02660	Spectrum Analyzer	Agilent	E4446A	7/9/2015	7/9/2017

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (MHz)	Limit (MHz)	Results
2402	1	QPSK	1.693	83.5	PASS
2440	1	QPSK	1.819	83.5	PASS
2480	1	QPSK	1.655	83.5	PASS

## Plots



Low Channel





Middle Channel



High Channel

Test Setup Photos



## 15.249(a) Field Strength of Fundamental

### Test Setup/Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 17:49:17  
 Tested By: Hieu Song Nguyenpham Sequence#: 48  
 Software: EMITest 5.03.02

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Test Conditions / Notes:

Application: Mason Custom Application ver 1.0

Temperature: 22.3°C

Relative Humidity: 39 %

Atmospheric Pressure: 101.2 kPa

High Clock: 120MHz

Gain of the antenna for Bluetooth= -1dBi

Method: ANSI C63.10 2013

RBW=3MHz

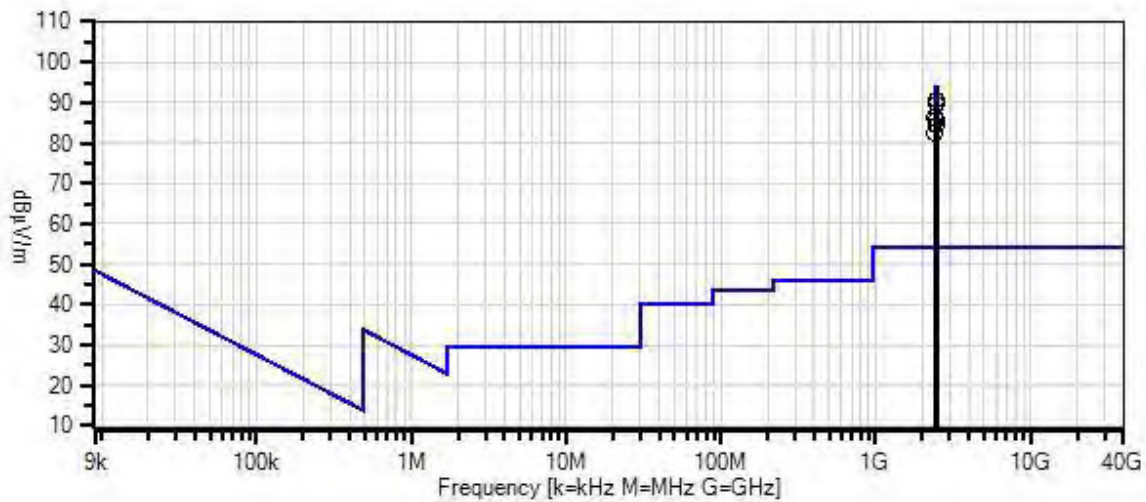
VBW=8MHz

The EUT is placed on a non-conducted table. It is operated continuously transmitting or receiving as intended.

A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.

Modification #1 was in place during testing.

Mason Target System W/O#: 97807 Sequence#: 48 Date: 3/21/2016  
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

**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	3/24/2014	3/24/2016
T3	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	2480.047M	60.5	+26.3	+1.2	+2.6		+0.0	90.6	94.0	-3.4	Horiz
2	2439.995M	59.8	+26.1	+1.2	+2.6		+0.0	89.7	94.0	-4.3	Horiz
3	2402.185M	56.5	+26.0	+1.2	+2.6		+0.0	86.3	94.0	-7.7	Horiz
4	2480.047M	55.5	+26.3	+1.2	+2.6		+0.0	85.6	94.0	-8.4	Vert
5	2439.995M	54.4	+26.1	+1.2	+2.6		+0.0	84.3	94.0	-9.7	Vert
6	2402.185M	52.6	+26.0	+1.2	+2.6		+0.0	82.4	94.0	-11.6	Vert

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V <sub>Minimum</sub> (dBuV/m)	V <sub>Nominal</sub> (dBuV/m)	V <sub>Maximum</sub> (dBuV/m)	Max Deviation from V <sub>Nominal</sub> (dB)
2480	QPSK/ Integral	90.7	90.6	90.57	0.1

Test performed using operational mode with the highest output power, representing worst case.

**Parameter Definitions:**

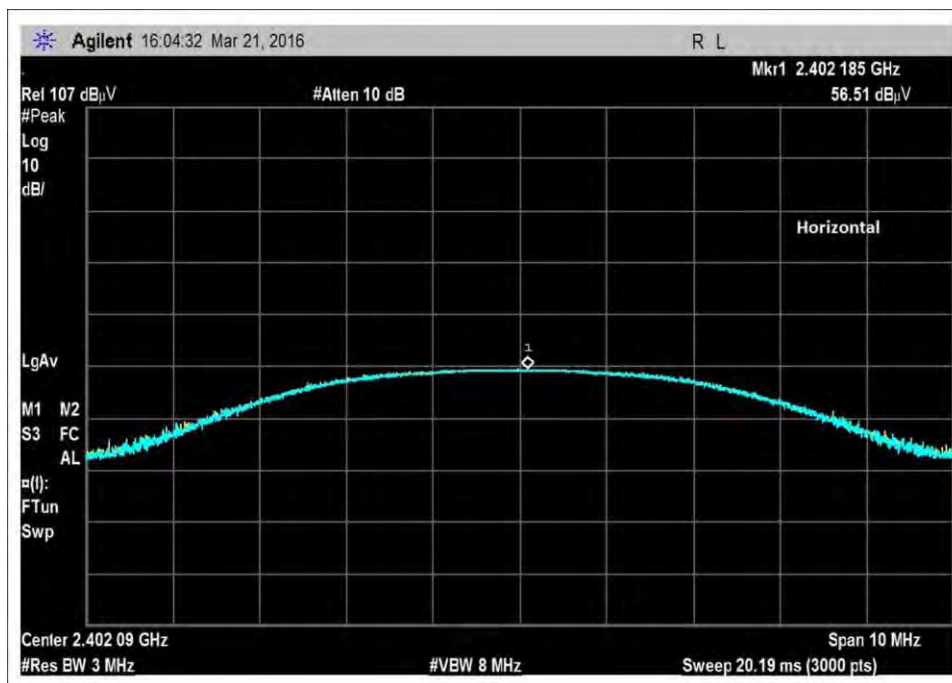
Measurements performed at input voltage V<sub>Nominal</sub> ± 15%.

Parameter	Value
V <sub>Nominal</sub> :	5 VDC
V <sub>Minimum</sub> :	4.25 VDC
V <sub>Maximum</sub> :	5.75 VDC

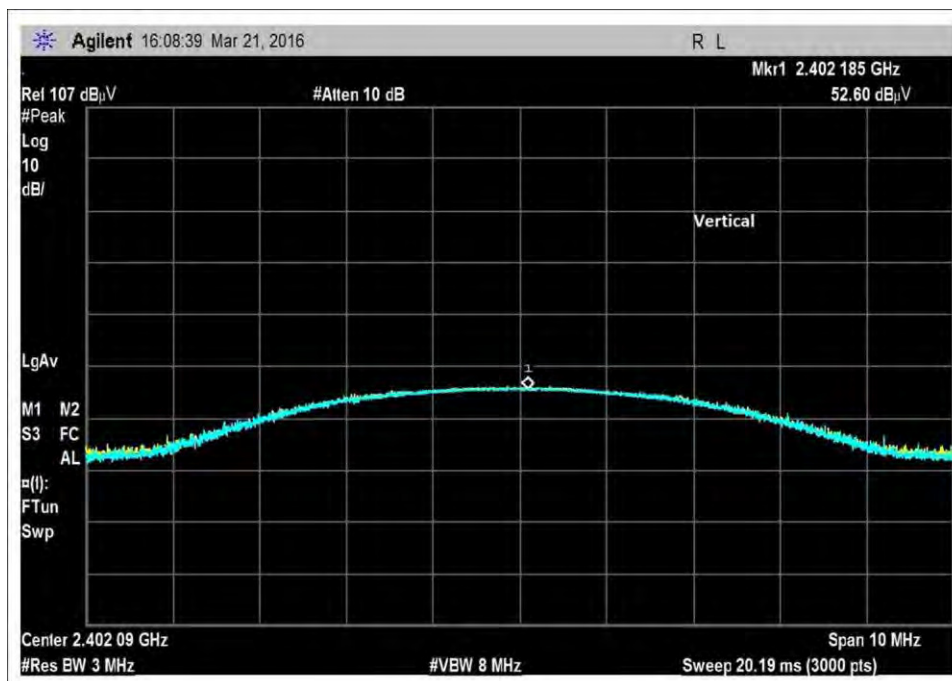
Test Data Summary – Radiated Field Strength Measurement					
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
2402 Horizontal	QPSK	Integral	86.3	≤94	Pass
2402 Vertical	QPSK	Integral	82.4	≤94	Pass
2440 Horizontal	QPSK	Integral	89.7	≤94	Pass
2440 Vertical	QPSK	Integral	84.3	≤94	Pass
2480 Horizontal	QPSK	Integral	90.6	≤94	Pass
2480 Vertical	QPSK	Integral	85.6	≤94	Pass



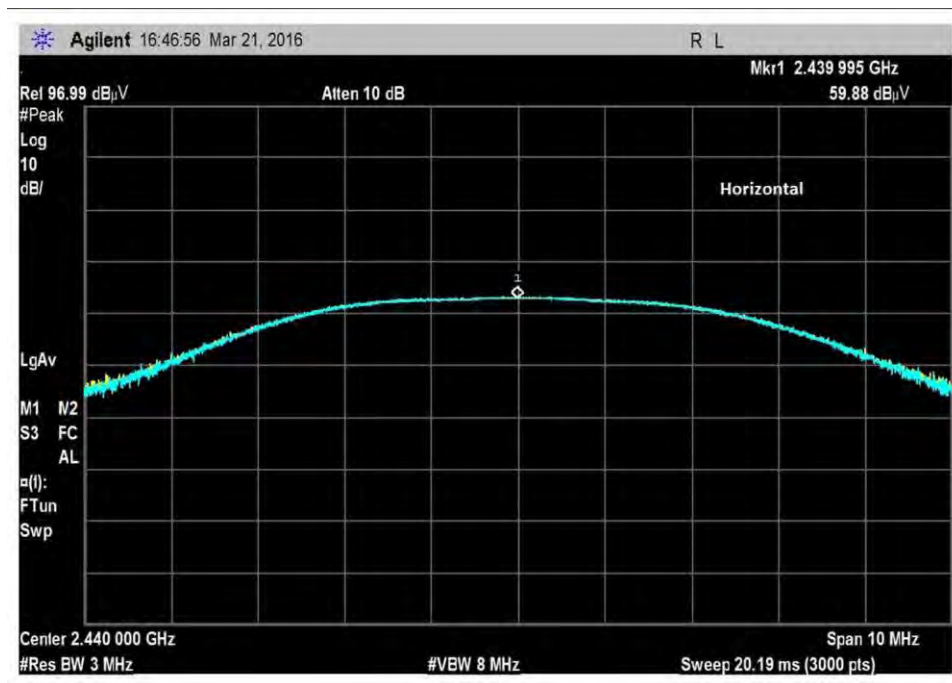
## Plots



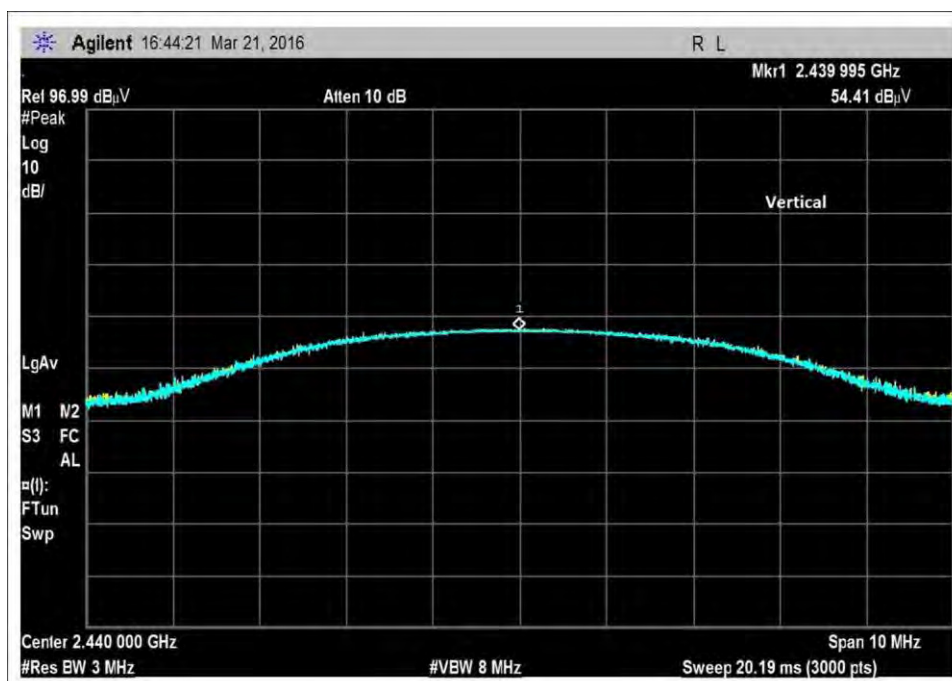
Low Channel, Horizontal



Low Channel, Vertical

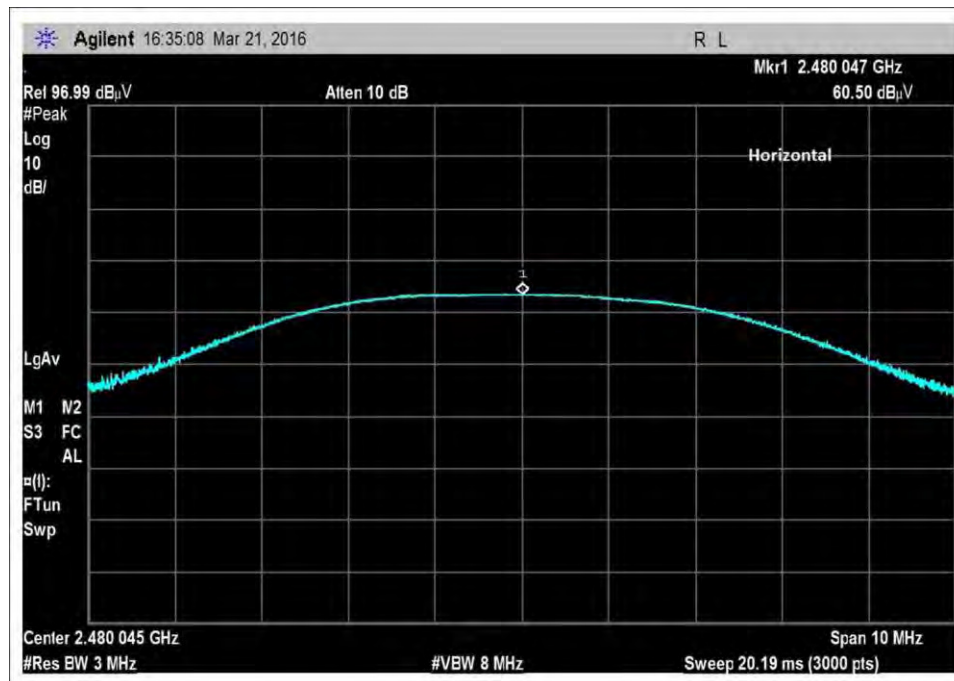


Middle Channel, Horizontal

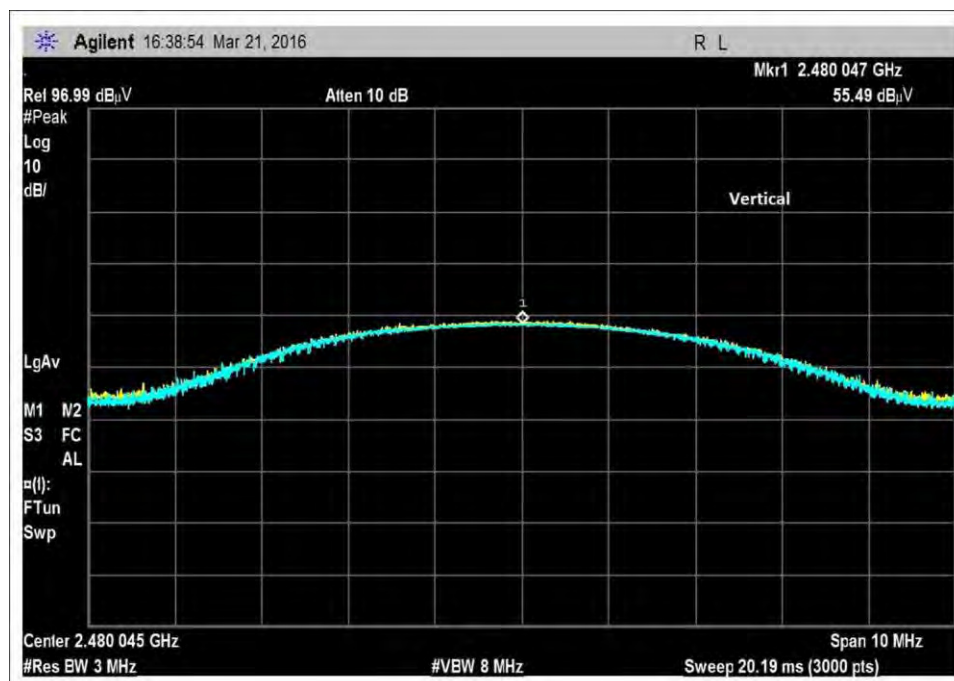


Middle Channel, Vertical





High Channel, Horizontal



High Channel, Vertical

Test Setup Photos



## 15.249(a) Field Strength of Spurious Emissions / Radiated

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 19:13:40  
 Tested By: Hieu Song Nguyenpham Sequence#: 51  
 Software: EMITest 5.03.02

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

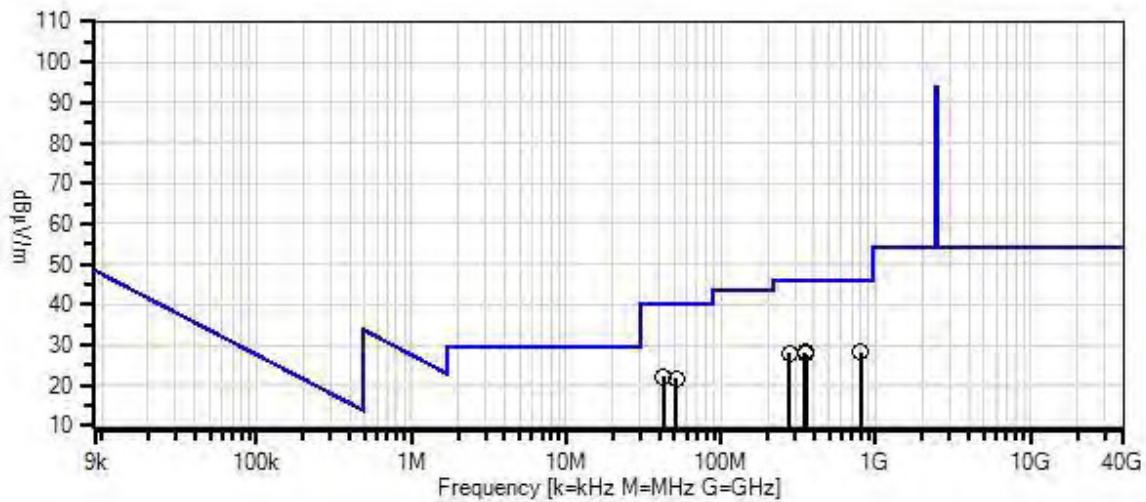
#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Test Conditions / Notes:

Radiated Emission  
 Frequency Range: 9kHz to 1000MHz  
  
 Application: Mason Custom Application ver 1.0  
  
 Temperature: 21.6°C  
 Relative Humidity: 43 %  
 Atmospheric Pressure: 101.5 kPa  
  
 High Clock: 120MHz  
 Gain of the antenna for Bluetooth= -1dBi  
 Method: ANSI C63.10 2013  
  
 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 placed on a non-conducted table. It is operated continuously transmitting or receiving as intended.  
 A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.  
  
 Modification #1 was in place during testing.  
  
**Low Channel**

Mason Target System W/O#: 97807 Sequence#: 51 Date: 3/21/2016  
 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

**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
	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	350.576M	37.8	-27.4 +0.7	+15.0	+1.8	+0.4	+0.0	28.3	46.0	-17.7	Vert
2	42.667M	36.9	-28.0 +0.2	+12.4	+0.6	+0.1	+0.0	22.2	40.0	-17.8	Vert
3	796.247M	29.4	-28.0 +1.3	+21.9	+2.9	+0.7	+0.0	28.2	46.0	-17.8	Horiz
4	277.198M	39.3	-27.0 +0.6	+13.1	+1.6	+0.3	+0.0	27.9	46.0	-18.1	Horiz
5	352.034M	37.3	-27.4 +0.7	+15.0	+1.8	+0.4	+0.0	27.8	46.0	-18.2	Horiz
6	51.547M	40.1	-27.9 +0.2	+8.6	+0.6	+0.1	+0.0	21.7	40.0	-18.3	Vert

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 16:53:28  
 Tested By: Hieu Song Nguyenpham Sequence#: 47  
 Software: EMITest 5.03.02

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Support Equipment:**

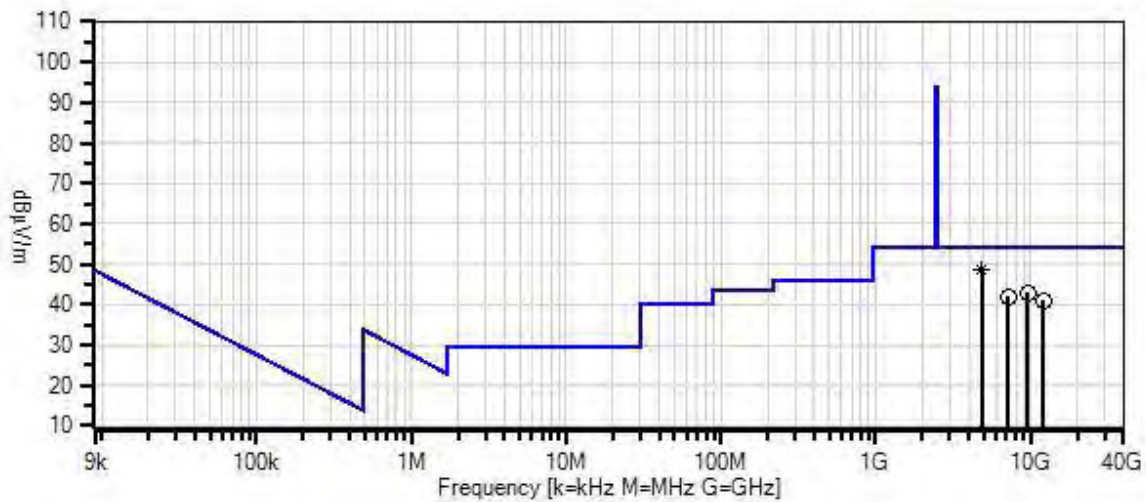
Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

<p>Radiated Emission          Frequency Range: 1000MHz to 25000MHz</p> <p>Application: Mason Custom Application ver 1.0</p> <p>Temperature: 21.6°C          Relative Humidity: 43 %          Atmospheric Pressure: 101.5 kPa</p> <p>High Clock: 120MHz          Gain of the antenna for Bluetooth= -1dBi          Method: ANSI C63.10 2013</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 placed on a non-conducted table. It is operated continuously transmitting or receiving as intended. A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.</p> <p>Modification #1 was in place during testing.</p> <p><b>Low Channel</b></p>
--



Mason Target System WO#: 97807 Sequence#: 47 Date: 3/21/2016  
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/24/2014	3/24/2016
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
T6	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017
T7	ANP00928	Cable	various	1/25/2016	1/25/2018
T8	ANP00929	Cable	various	1/25/2016	1/25/2018
T9	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	1/18/2016	1/18/2018
T10	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
T11	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017
	ANP06138	Cable	32022-29094K-29094K-72TC	3/18/2015	3/18/2017
	AN03143	Cable	32022-29094K-144TC	3/18/2015	3/18/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dBμV	T9	T10	T11		Table	dBμV/m	dBμV/m	dB	Ant
1	4803.920M	68.9	-57.8	+30.8	+1.7	+3.8	+0.0	48.5	54.0	-5.5	Vert
	Ave		+0.8	+0.0	+0.0	+0.0					
			+0.3	+0.0	+0.0						
^	4803.920M	76.2	-57.8	+30.8	+1.7	+3.8	+0.0	55.8	54.0	+1.8	Vert
			+0.8	+0.0	+0.0	+0.0					
			+0.3	+0.0	+0.0						
3	9606.835M	56.2	-57.2	+34.8	+2.4	+5.4	+0.0	43.0	54.0	-11.0	Vert
			+1.1	+0.0	+0.0	+0.0					
			+0.3	+0.0	+0.0						
4	7206.615M	57.8	-58.3	+34.1	+2.0	+5.0	+0.0	41.9	54.0	-12.1	Vert
			+1.0	+0.0	+0.0	+0.0					
			+0.3	+0.0	+0.0						
5	12010.419M	47.4	+4.8	+0.6	+2.5	+0.0	+0.0	41.0	54.0	-13.0	Horiz
			-14.3	-14.3	-14.3	-14.3					
			-14.3	-14.3	-14.3						



Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 19:30:33  
 Tested By: Hieu Song Nguyenpham Sequence#: 54  
 Software: EMITest 5.03.02

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

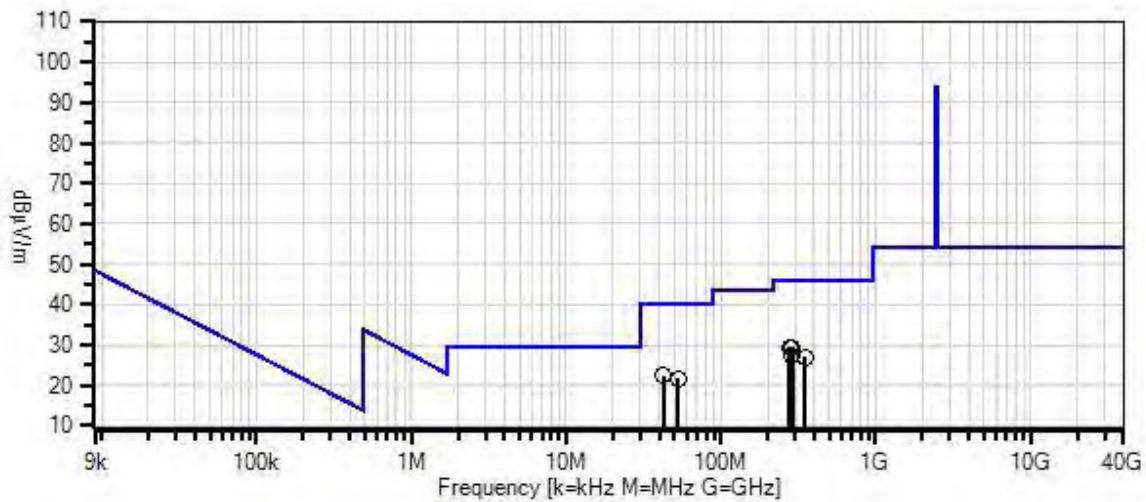
***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

<p>Radiated Emission          Frequency Range: 9kHz to 1000MHz</p> <p>Application: Mason Custom Application ver 1.0</p> <p>Temperature: 21.6°C          Relative Humidity: 43 %          Atmospheric Pressure: 101.5 kPa</p> <p>High Clock: 120MHz          Gain of the antenna for Bluetooth= -1dBi          Method: ANSI C63.10 2013</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 placed on a non-conducted table. It is operated continuously transmitting or receiving as intended.          A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.</p> <p>Modification #1 was in place during testing.</p> <p><b>Middle Channel</b></p>
--

Mason Target System W/O#: 97807 Sequence#: 54 Date: 3/21/2016  
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

**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
	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	277.441M	40.8	-27.0 +0.6	+13.1	+1.6	+0.3	+0.0	29.4	46.0	-16.6	Horiz
2	289.590M	40.5	-27.0 +0.7	+13.2	+1.6	+0.3	+0.0	29.3	46.0	-16.7	Vert
3	42.709M	37.0	-28.0 +0.2	+12.4	+0.6	+0.1	+0.0	22.3	40.0	-17.7	Vert
4	53.020M	40.6	-27.9 +0.2	+8.2	+0.6	+0.1	+0.0	21.8	40.0	-18.2	Vert
5	284.244M	38.6	-27.0 +0.7	+13.2	+1.6	+0.3	+0.0	27.4	46.0	-18.6	Horiz
6	350.576M	36.4	-27.4 +0.7	+15.0	+1.8	+0.4	+0.0	26.9	46.0	-19.1	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 16:28:49  
 Tested By: Hieu Song Nguyenpham Sequence#: 44  
 Software: EMITest 5.03.02

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

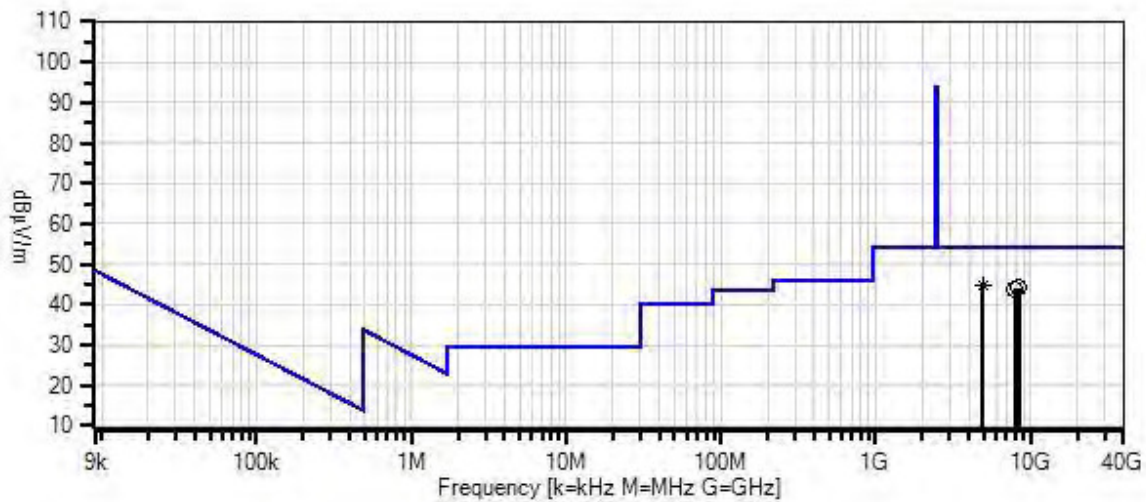
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

<p>Radiated Emission          Frequency Range: 1000MHz to 25000MHz</p> <p>Application: Mason Custom Application ver 1.0</p> <p>Temperature: 21.6°C          Relative Humidity: 43 %          Atmospheric Pressure: 101.5 kPa</p> <p>High Clock: 120MHz          Gain of the antenna for Bluetooth= -1dBi          Method: ANSI C63.10 2013</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 placed on non-conducted table. It is operated continuously transmitting or receiving as intended.          A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.</p> <p>Modification #1 was in place during testing.</p> <p><b>Middle Channel</b></p>
---

Mason Target System W/O#: 97807 Sequence#: 44 Date: 3/21/2016  
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters



- Readings
- Peak Readings
- × QP Readings
- \* Average Readings
- ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/24/2014	3/24/2016
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	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
T6	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	1/18/2016	1/18/2018
T7	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017
	AN03143	Cable	32022-29094K-144TC	3/18/2015	3/18/2017
	ANP06138	Cable	32022-29094K-29094K-72TC	3/18/2015	3/18/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	4879.980M	64.7	-57.6	+30.9	+1.7	+3.8	+0.0	44.6	54.0	-9.4	Vert
	Ave		+0.8	+0.3	+0.0						
^	4879.980M	72.4	-57.6	+30.9	+1.7	+3.8	+0.0	52.3	54.0	-1.7	Vert
			+0.8	+0.3	+0.0						
3	8354.349M	55.9	-56.4	+35.9	+2.2	+5.2	+0.0	44.1	54.0	-9.9	Vert
			+1.0	+0.0	+0.3						
4	7874.870M	57.8	-57.7	+35.2	+2.2	+5.1	+0.0	44.0	54.0	-10.0	Vert
			+1.0	+0.0	+0.4						

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 19:42:22  
 Tested By: Hieu Song Nguyenpham Sequence#: 57  
 Software: EMITest 5.03.02

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

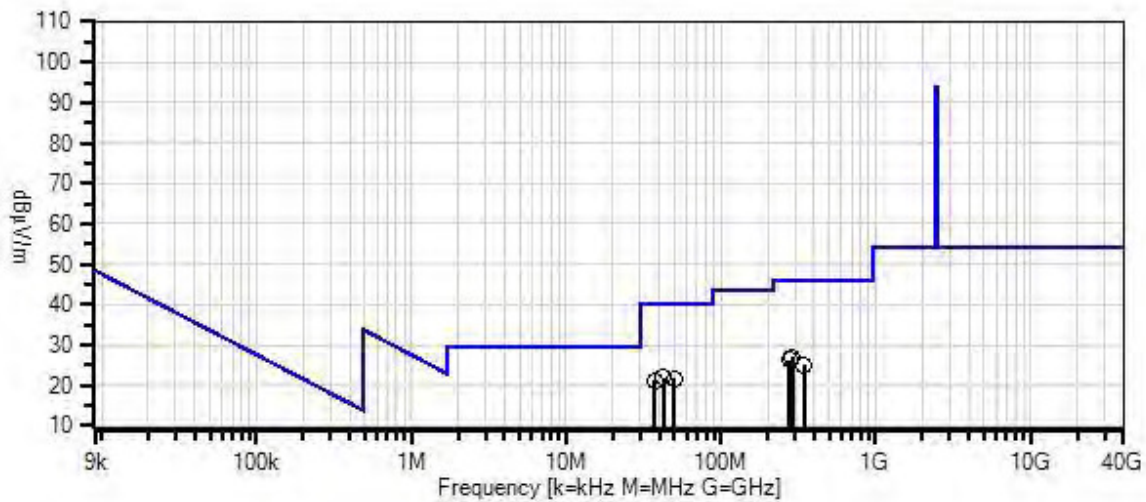
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

<p>Radiated Emission          Frequency Range: 9kHz to 1000MHz</p> <p>Application: Mason Custom Application ver 1.0</p> <p>Temperature: 21.6°C          Relative Humidity: 43 %          Atmospheric Pressure: 101.5 kPa</p> <p>High Clock: 120MHz          Gain of the antenna for Bluetooth= -1dBi          Method: ANSI C63.10 2013</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 placed on a non-conducted table. It is operated continuously transmitting or receiving as intended. A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.</p> <p>Modification 1 was in place during testing.</p> <p><b>High Channel</b></p>
--

Mason Target System W/O#: 97807 Sequence#: 57 Date: 3/21/2016  
 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters



- Readings
- Peak Readings
- × QP Readings
- \* Average Readings
- ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)



**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
	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	42.667M	36.6	-28.0 +0.2	+12.4	+0.6	+0.1	+0.0	21.9	40.0	-18.1	Vert
2	50.074M	39.5	-27.9 +0.2	+9.1	+0.6	+0.1	+0.0	21.6	40.0	-18.4	Vert
3	37.407M	33.3	-28.0 +0.2	+15.1	+0.5	+0.1	+0.0	21.2	40.0	-18.8	Vert
4	289.590M	38.3	-27.0 +0.7	+13.2	+1.6	+0.3	+0.0	27.1	46.0	-18.9	Vert
5	277.198M	37.7	-27.0 +0.6	+13.1	+1.6	+0.3	+0.0	26.3	46.0	-19.7	Horiz
6	344.745M	34.7	-27.3 +0.7	+14.8	+1.8	+0.4	+0.0	25.1	46.0	-20.9	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 16:07:54  
 Tested By: Hieu Song Nguyenpham Sequence#: 41  
 Software: EMITest 5.03.02

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

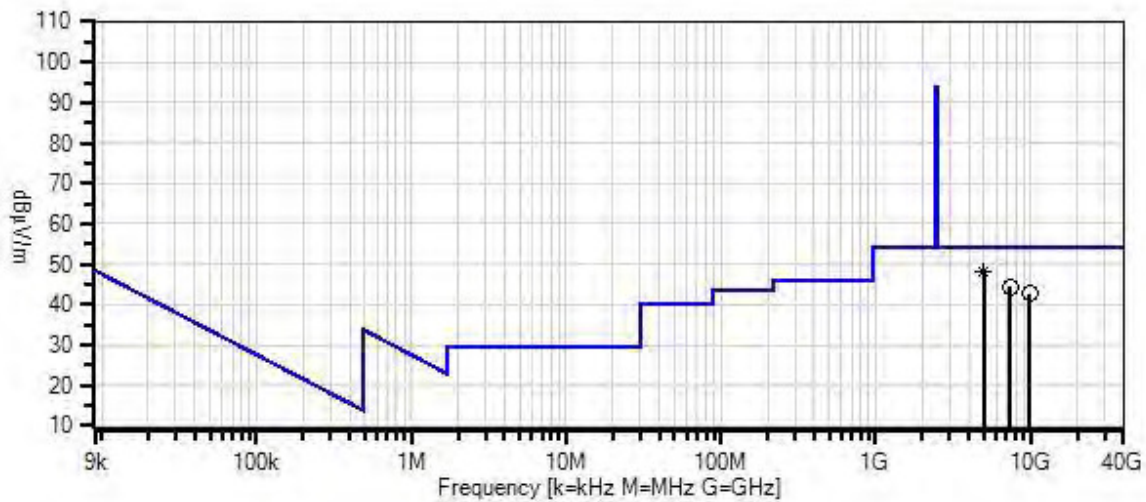
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

<p>Radiated Emission          Frequency Range: 1000MHz to 25000MHz</p> <p>Application: Mason Custom Application ver 1.0</p> <p>Temperature: 21.6°C          Relative Humidity: 43 %          Atmospheric Pressure: 101.5 kPa</p> <p>High Clock: 120MHz          Gain of the antenna for Bluetooth= -1dBi          Method: ANSI C63.10 2013</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 placed on a non-conducted table. It is operated continuously transmitting or receiving as intended. A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.</p> <p>Modification 1 was in place during testing.</p> <p><b>High Channel</b></p>
---

Mason Target System W/O#: 97807 Sequence#: 41 Date: 3/21/2016  
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/24/2014	3/24/2016
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	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
T6	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
	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017
	AN03143	Cable	32022-29094K-144TC	3/18/2015	3/18/2017
	ANP06138	Cable	32022-29094K-29094K-72TC	3/18/2015	3/18/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	4959.950M	67.8	-57.3 +0.8	+31.1 +0.3	+1.7	+3.8	+0.0	48.2	54.0	-5.8	Vert
^	4959.950M	75.2	-57.3 +0.8	+31.1 +0.3	+1.7	+3.8	+0.0	55.6	54.0	+1.6	Vert
3	7348.344M	59.9	-58.3 +1.0	+34.3 +0.3	+2.1	+5.0	+0.0	44.3	54.0	-9.7	Vert
4	9920.072M	55.9	-57.7 +1.1	+35.0 +0.4	+2.4	+5.7	+0.0	42.8	54.0	-11.2	Vert

Band Edge Summary					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2400	QPSK	Integral	44.7	<54	Pass
2483.5	QPSK	Integral	43.3	<54	Pass

### Band Edge Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**  
 Work Order #: **97807** Date: 3/21/2016  
 Test Type: **Radiated Scan** Time: 17:49:17  
 Tested By: Hieu Song Nguyenpham Sequence#: 48  
 Software: EMITest 5.03.02

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

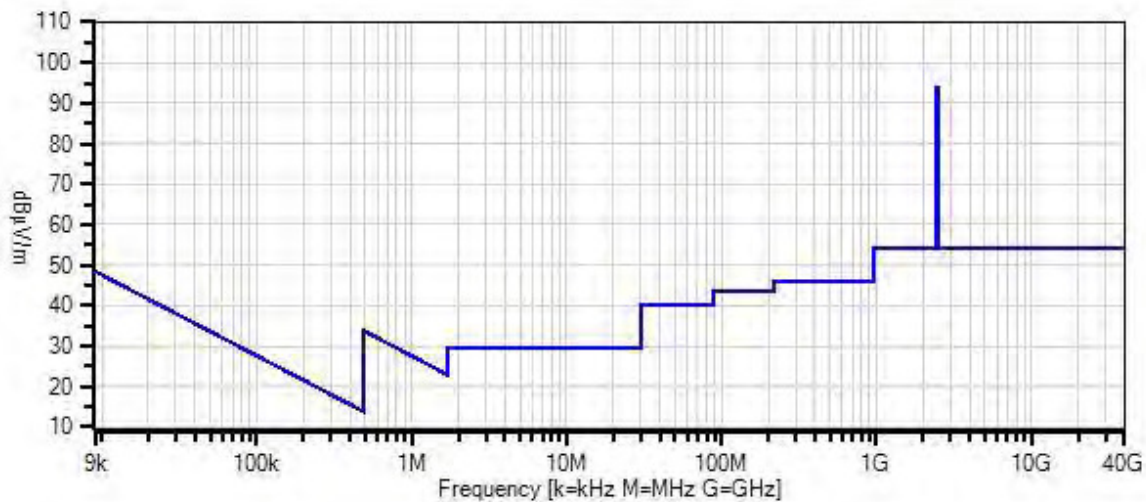
#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Test Conditions / Notes:

Application: Mason Custom Application ver 1.0  
  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
  
 High Clock: 120MHz  
 Gain of the antenna for Bluetooth= -1dBi  
 Method: ANSI C63.10 2013  
  
 The EUT is placed on a non-conducted table. It is operated continuously transmitting or receiving as intended.  
 A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.  
  
 Modification #1 was in place during testing.

Mason Target System WO#: 97807 Sequence#: 48 Date: 3/21/2016  
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters

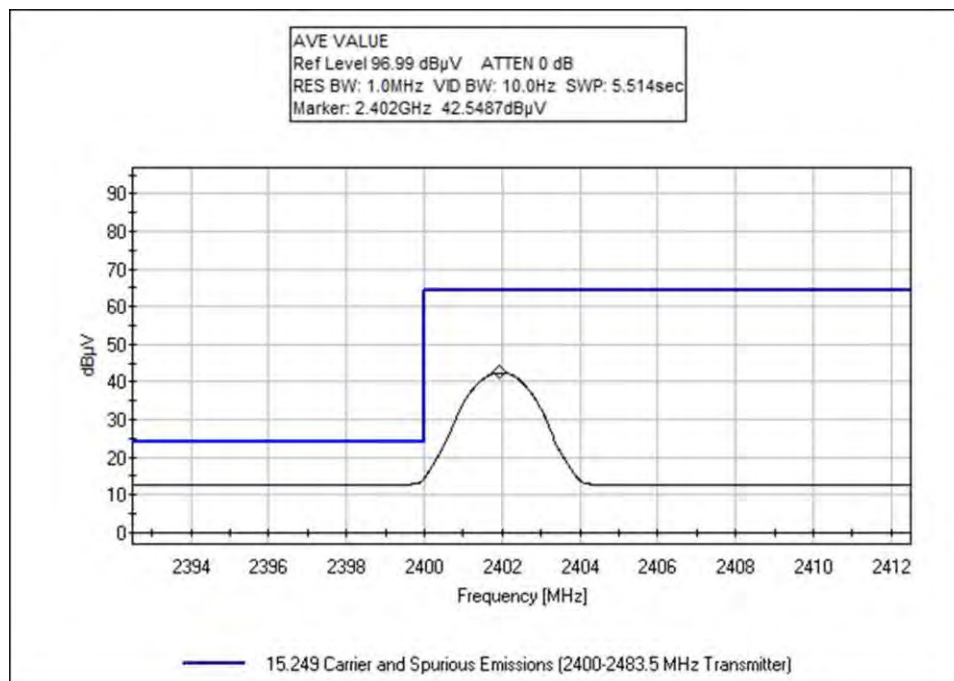
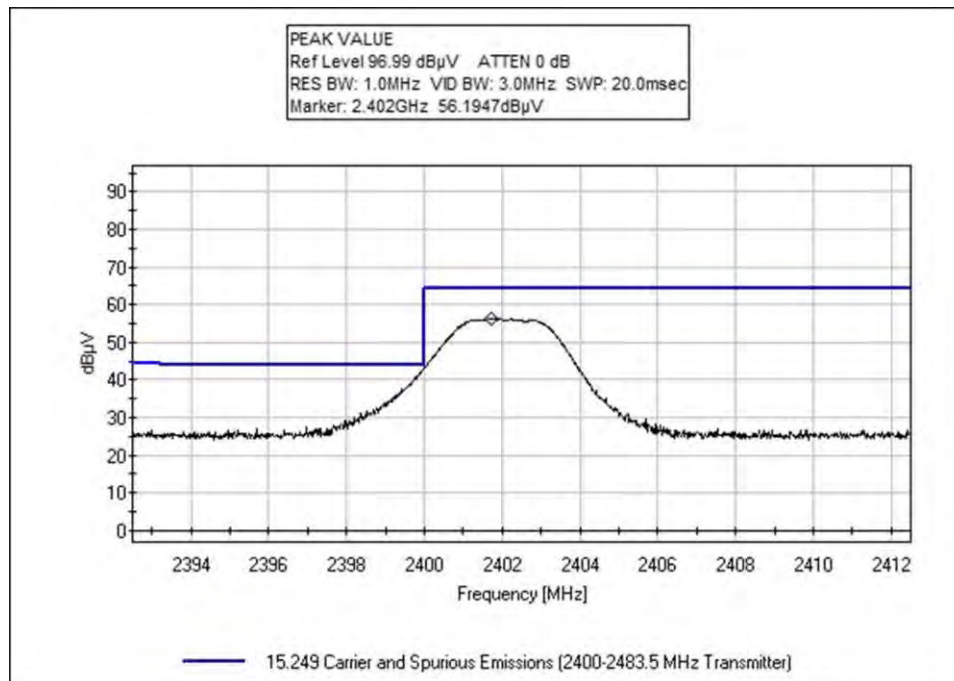


— Readings  
○ Peak Readings  
× QP Readings  
\* Average Readings  
▼ Ambient  
Software Version: 5.03.02  
— 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

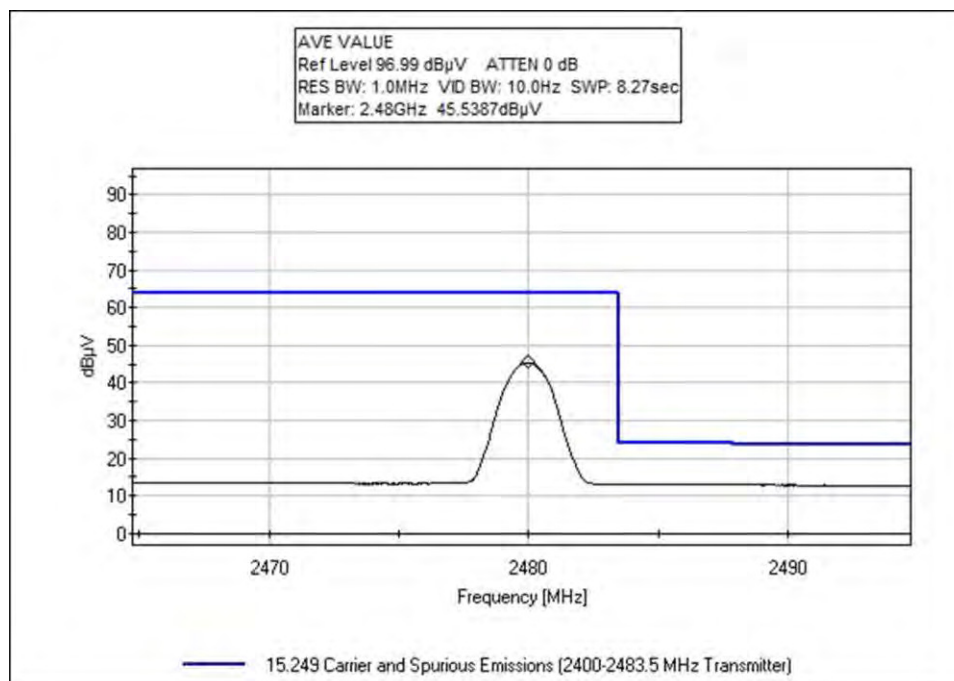
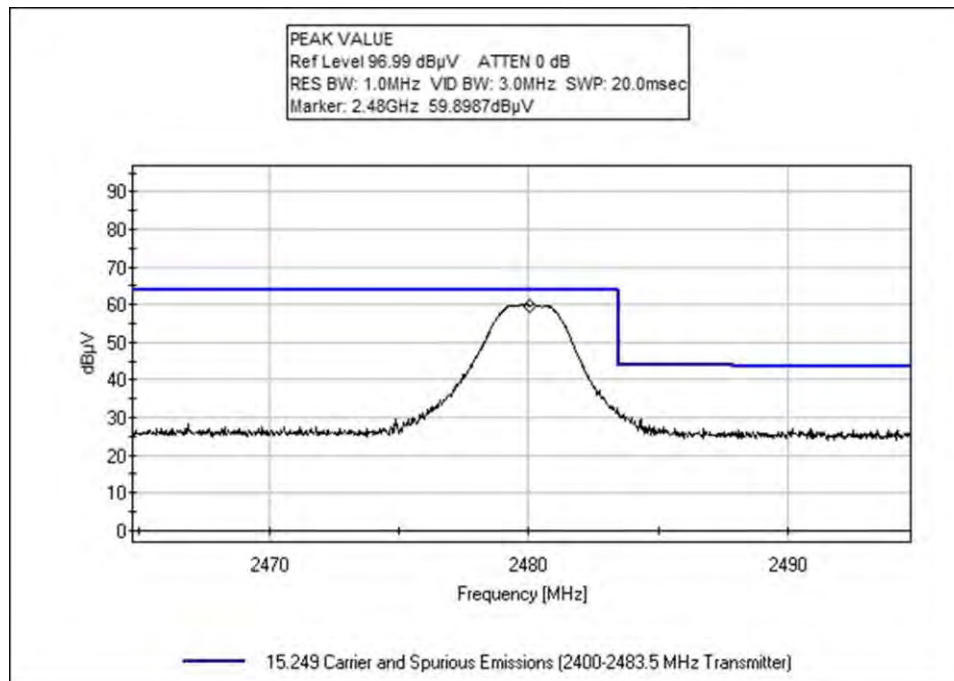
**Test Equipment:**

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	3/24/2014	3/24/2016
	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN02660	Spectrum Analyzer	E4446A	7/9/2015	7/9/2017

## Band Edge Plots

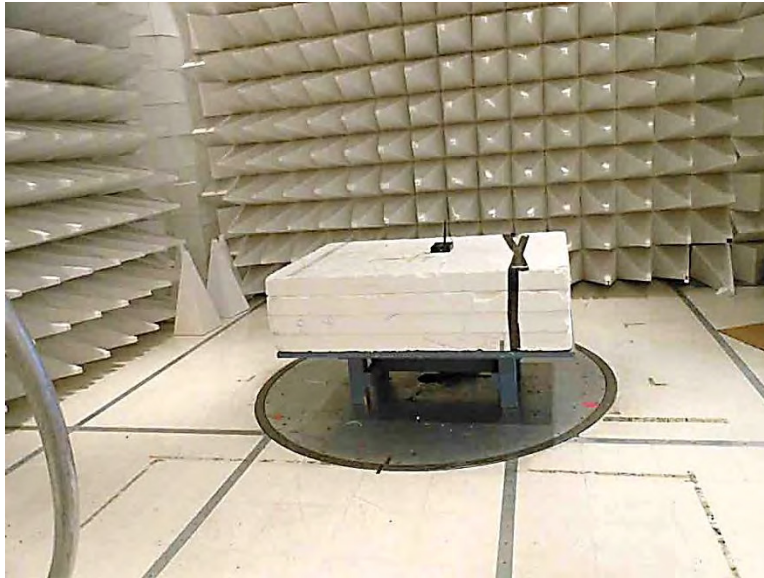




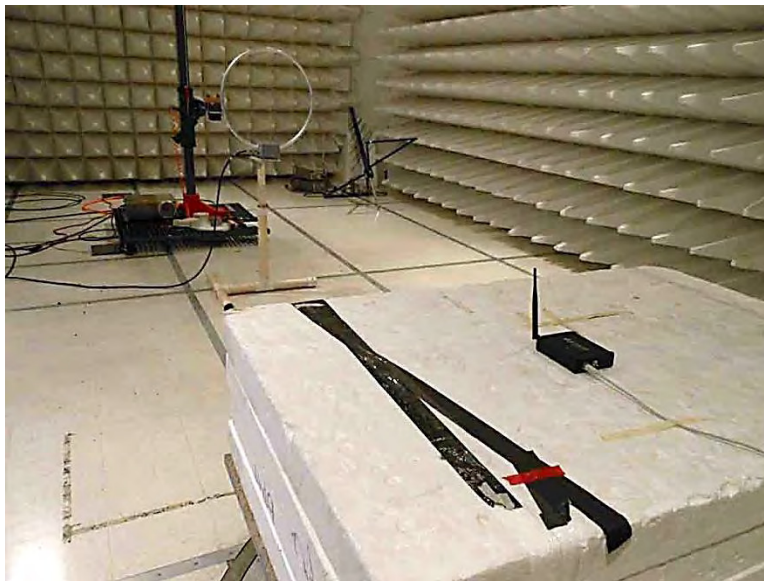




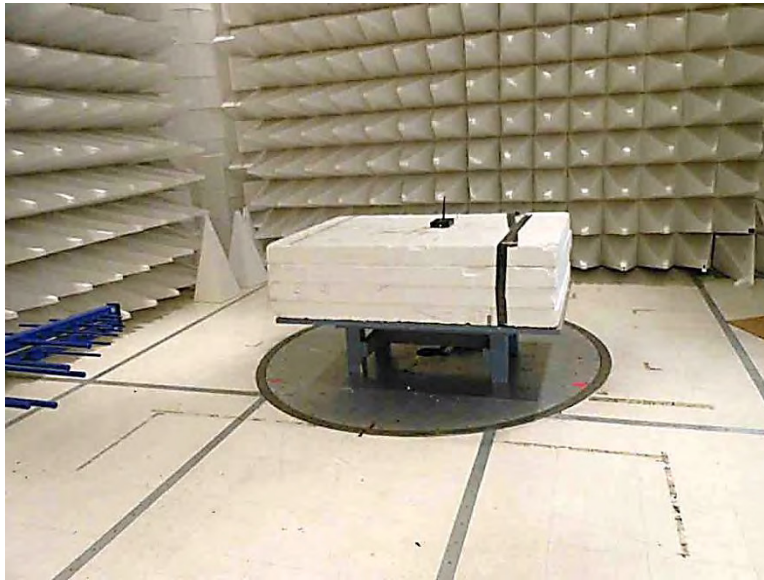
Test Setup Photos



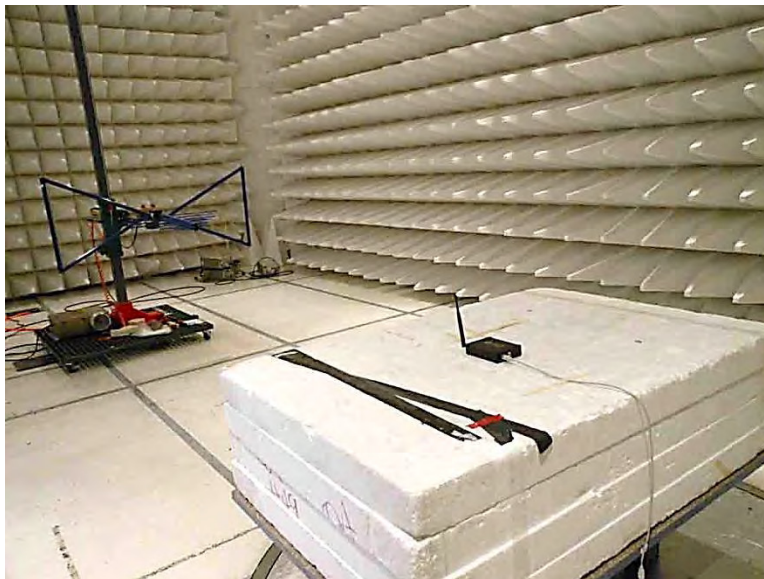
9kHz – 30MHz



9kHz – 30MHz



30MHz – 1GHz



30MHz – 1GHz

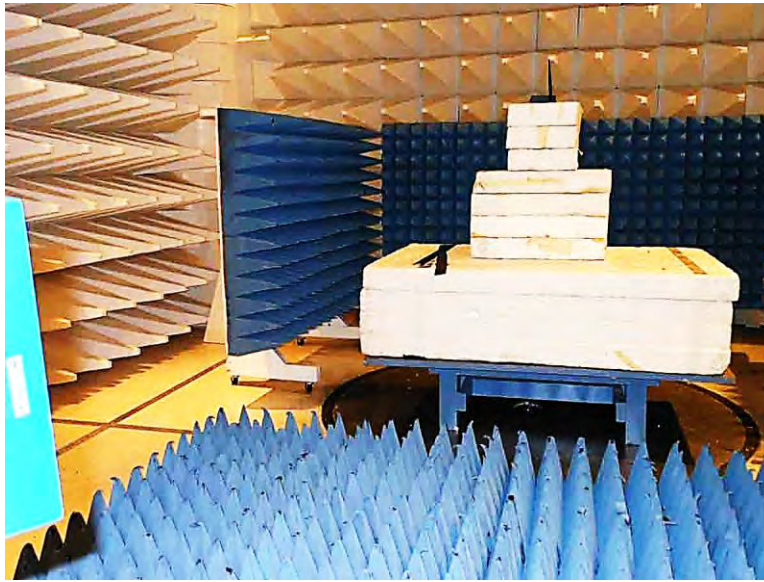


1 – 12GHz



1 – 12GHz





12 – 25GHz



12 – 25GHz

## 15.207 AC Conducted Emissions

### Test Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **97807** Date: 2/9/2016  
 Test Type: **Conducted Emissions** Time: 08:43:41  
 Tested By: Hieu Song Nguyenpham Sequence#: 5  
 Software: EMITest 5.03.02 120V 60Hz

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Support Equipment:

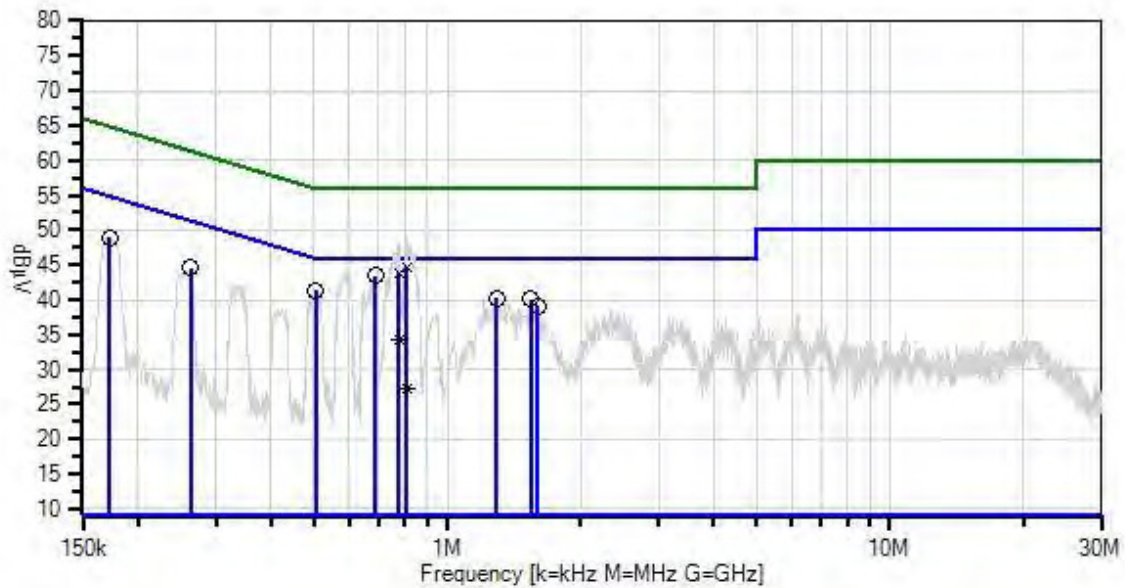
Device	Manufacturer	Model #	S/N
Configuration 1			

#### Test Conditions / Notes:

Conducted Emission  
 Frequency Range: 150kHz to 30MHz  
  
 Application: Mason Custom Application ver 1.0  
  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
  
 High Clock: 120MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Gain of the antenna for Bluetooth= -1dBi  
 Method: ANSI C63.10 2013  
  
 The EUT is placed on anon-conducted table. It is operated continuously transmitting or receiving as intended.  
 A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.

#### BLE in TX Mode at Middle Channel

Mason Target System WO#: 97807 Sequence#: 5 Date: 2/9/2016  
15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data  
x QP Readings  
Software Version: 5.03.02

— Readings  
\* Average Readings  
— 1 - 15.207 AC Mains - Average

○ Peak Readings  
▼ Ambient  
— 2 - 15.207 AC Mains - Quasi-peak

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	AN00493	50uH LISN-L1 (L) Loss W/O European Adapter	3816/NM	3/4/2015	3/4/2017
	AN00493	50uH LISN-L(2) N Loss W/O European Adapter	3816/NM	3/4/2015	3/4/2017
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018
T5	ANP05258	High Pass Filter	HE9615-150K- 50-720B	11/14/2014	11/14/2016

**Measurement Data:**

Reading listed by margin.

Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV	dBμV	dB	Ant
1	688.132k	33.4	+9.8 +0.1	+0.0	+0.0	+0.1	+0.0	43.4	46.0	-2.6	Line
2	504.149k	31.1	+9.9 +0.2	+0.0	+0.0	+0.1	+0.0	41.3	46.0	-4.7	Line
3	1.294M	30.0	+9.8 +0.2	+0.1	+0.0	+0.1	+0.0	40.2	46.0	-5.8	Line
4	172.543k	38.5	+9.9 +0.4	+0.0	+0.0	+0.1	+0.0	48.9	54.8	-5.9	Line
5	1.541M	29.9	+9.8 +0.2	+0.1	+0.0	+0.1	+0.0	40.1	46.0	-5.9	Line
6	263.444k	34.4	+9.9 +0.1	+0.0	+0.0	+0.1	+0.0	44.5	51.3	-6.8	Line
7	1.600M	28.9	+9.8 +0.2	+0.1	+0.0	+0.1	+0.0	39.1	46.0	-6.9	Line
8	808.121k QP	34.6	+9.8 +0.2	+0.0	+0.0	+0.1	+0.0	44.7	56.0	-11.3	Line
9	775.397k Ave	24.1	+9.8 +0.2	+0.0	+0.0	+0.1	+0.0	34.2	46.0	-11.8	Line
10	775.397k QP	33.7	+9.8 +0.2	+0.0	+0.0	+0.1	+0.0	43.8	56.0	-12.2	Line
^	775.397k	37.3	+9.8 +0.2	+0.0	+0.0	+0.1	+0.0	47.4	46.0	+1.4	Line
12	808.121k Ave	17.2	+9.8 +0.2	+0.0	+0.0	+0.1	+0.0	27.3	46.0	-18.7	Line
^	808.121k	39.1	+9.8 +0.2	+0.0	+0.0	+0.1	+0.0	49.2	46.0	+3.2	Line



Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170  
 Customer: **Mason Target Systems**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **97807** Date: 2/9/2016  
 Test Type: **Conducted Emissions** Time: 08:59:40  
 Tested By: Hieu Song Nguyenpham Sequence#: 6  
 Software: EMITest 5.03.02 120V 60Hz

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

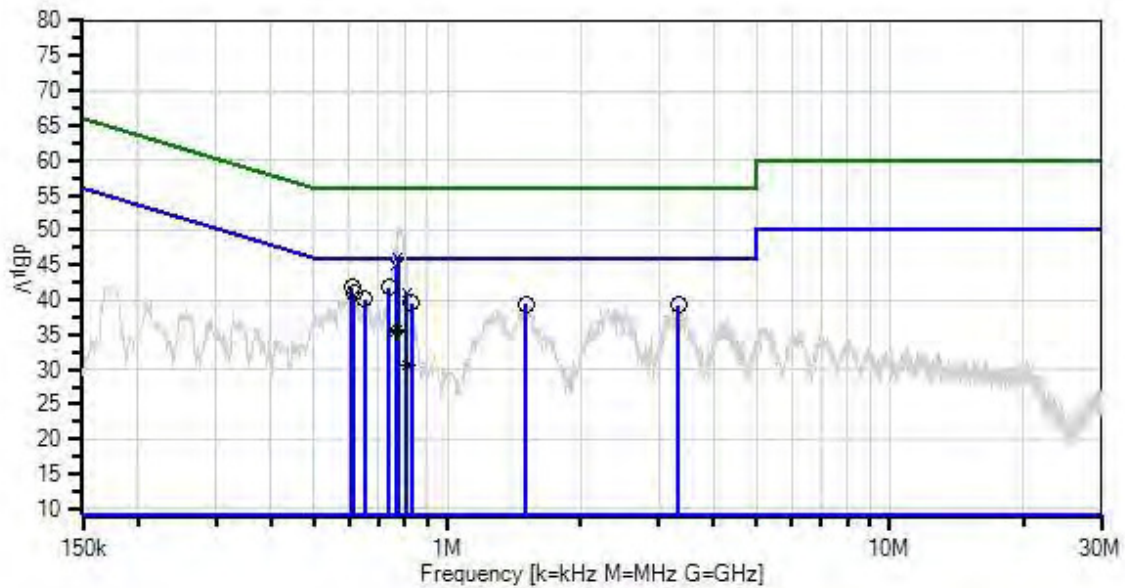
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

<p>Conducted Emission          Frequency Range: 150kHz to 30MHz</p> <p>Application: Mason Custom Application ver 1.0</p> <p>Temperature: 22.3°C          Relative Humidity: 39 %          Atmospheric Pressure: 101.2 kPa</p> <p>High Clock: 120MHz          Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth          Gain of the antenna for Bluetooth= -1dBi          Method: ANSI C63.10 2013</p> <p>The EUT is placed on a non-conducted table. It is operated continuously transmitting or receiving as intended. A single modular approved module operating in 902.4-927.6MHz, FCCID: MCQ-XB900HP is installed in the product, an external antenna is connected to the product during the evaluation. The modular approved module was receiving simultaneously during the evaluation of the Bluetooth radio.</p> <p><b>BLE in TX Mode at Middle Channel</b></p>
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Mason Target System WO#: 97807 Sequence#: 6 Date: 2/9/2016  
15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data  
x QP Readings  
Software Version: 5.03.02

— Readings  
\* Average Readings  
— 1 - 15.207 AC Mains - Average

○ Peak Readings  
▼ Ambient  
— 2 - 15.207 AC Mains - Quasi-peak

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN00493	50uH LISN-L1 (L) Loss W/O European Adapter	3816/NM	3/4/2015	3/4/2017
T4	AN00493	50uH LISN-L(2) N Loss W/O European Adapter	3816/NM	3/4/2015	3/4/2017
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018
T5	ANP05258	High Pass Filter	HE9615-150K- 50-720B	11/14/2014	11/14/2016

**Measurement Data:**

Reading listed by margin.

Test Lead: Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V	dB $\mu$ V	dB	Ant
1	609.594k	31.1	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	41.8	46.0	-4.2	Neutr
2	739.036k	31.0	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	41.7	46.0	-4.3	Neutr
3	613.957k	30.2	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	40.9	46.0	-5.1	Neutr
4	651.044k	29.5	+9.8 +0.1	+0.0	+0.0	+0.7	+0.0	40.1	46.0	-5.9	Neutr
5	829.210k	28.8	+9.8 +0.2	+0.0	+0.0	+0.7	+0.0	39.5	46.0	-6.5	Neutr
6	1.507M	28.6	+9.8 +0.2	+0.1	+0.0	+0.7	+0.0	39.4	46.0	-6.6	Neutr
7	3.327M	28.4	+9.8 +0.2	+0.1	+0.0	+0.8	+0.0	39.3	46.0	-6.7	Neutr
8	771.761k QP	35.4	+9.8 +0.2	+0.0	+0.0	+0.7	+0.0	46.1	56.0	-9.9	Neutr
9	771.761k Ave	25.1	+9.8 +0.2	+0.0	+0.0	+0.7	+0.0	35.8	46.0	-10.2	Neutr
^	771.761k	39.1	+9.8 +0.2	+0.0	+0.0	+0.7	+0.0	49.8	46.0	+3.8	Neutr

11	765.216k	24.5	+9.9 +0.2	+0.0	+0.0	+0.7	+0.0	35.3	46.0	-10.7	Neutr
	Ave										
12	765.216k	34.2	+9.9 +0.2	+0.0	+0.0	+0.7	+0.0	45.0	56.0	-11.0	Neutr
	QP										
^	765.216k	37.4	+9.9 +0.2	+0.0	+0.0	+0.7	+0.0	48.2	46.0	+2.2	Neutr
14	810.303k	30.3	+9.8 +0.2	+0.0	+0.0	+0.7	+0.0	41.0	56.0	-15.0	Neutr
	QP										
15	810.303k	20.0	+9.8 +0.2	+0.0	+0.0	+0.7	+0.0	30.7	46.0	-15.3	Neutr
	Ave										
^	810.303k	33.7	+9.8 +0.2	+0.0	+0.0	+0.7	+0.0	44.4	46.0	-1.6	Neutr

Test Setup Photos



## 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	( $\text{dB}/\text{m}$ )
+	Cable Loss	( $\text{dB}$ )
-	Distance Correction	( $\text{dB}$ )
-	Preamplifier Gain	( $\text{dB}$ )
=	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.