

# Davis Instruments

EMC TEST REPORT FOR

**Enviromonitor Gateway  
Model: 6800**

**Tested To The Following Standards:**

**FCC Part 15 Subpart C Section: 15.247  
(FHSS 902-928 MHz)**

**Report No.: 97540-13**

**Date of issue: November 11, 2015**



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:**

Davis Instruments  
3465 Diablo Avenue  
Hayward, CA 94545

Representative: Perry Dillon  
Customer Reference Number: 85378

**DATE OF EQUIPMENT RECEIPT:**

**DATE(S) OF TESTING:**

**REPORT PREPARED BY:**

Dianne Dudley  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Project Number: 97540

October 12, 2015

October 12-21, 2015

### 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	5.02.00
EMITest Immunity	5.02.00

## 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**

Test Procedure	Description	Modifications	Results
<b>15.247(a) Fundamental Characteristics</b>			
15.247(a)(1)	Carrier Separation	NA	Pass
15.247(a)(1)(i)	20dB Bandwidth	NA	Pass
15.247(a)(1)(i)	Number of Hopping Channels	NA	Pass
15.247(a)(1)(i)	Average Time of Occupancy	NA	Pass
<b>15.247(b) Output Power</b>			
15.247(b)(2)	Peak Conducted Output Power	NA	Pass
<b>15.247(d) Spurious Emissions</b>			
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	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
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
Enviromonitor Gateway	Davis Instruments	6800	002

#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
Laptop Computer	Fujitsu	C1410 Dual-Core TS600	R6Z16003

**FCC PART 15 SUBPART C**

**15.247(a) Fundamental Characteristics**

**Test Conditions / Setup**

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instrument**  
 Specification: **15.247(a)(i)-OBW Set up**  
 Work Order #: **97540** Date: 10/16/2015  
 Test Type: **Conducted Power Measurement** Time:  
 Tested By: Hieu Song Nguyenpham Sequence#:  
 Software: EMITest 5.02.00

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	P06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
T2	P01211	Attenuator	23-10-34	3/31/2015	3/31/2017
	03471	Spectrum Analyzer	E4440A	12/19/2013	12/19/2015

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

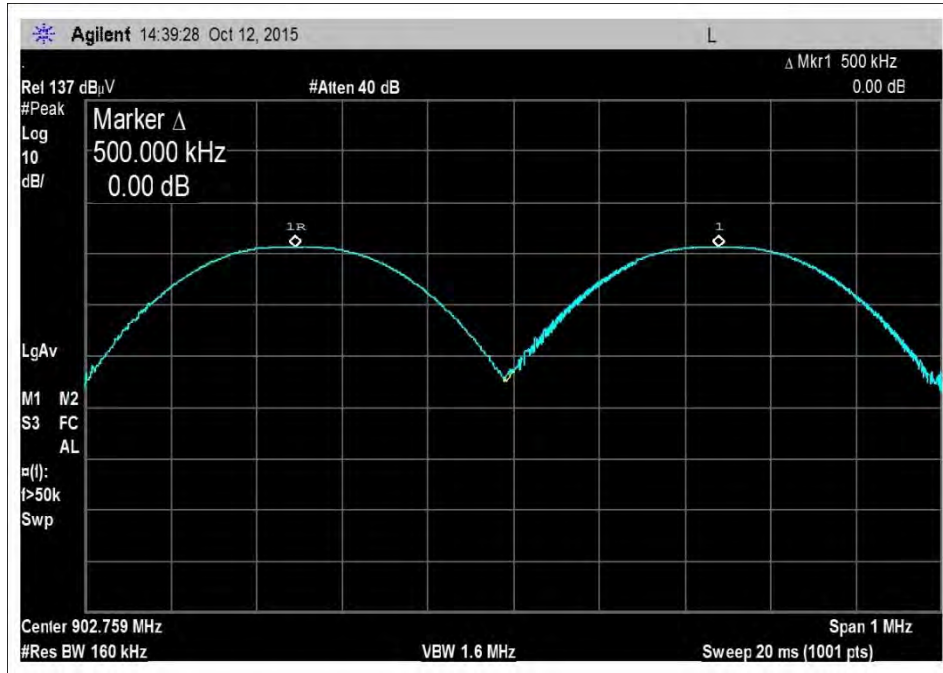
**Test Conditions / Notes:**

15.247 (a)(i): OBW  
 Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C 63.10 2009 section 6.9.1 & 7.7

The EUT is placed on the table and set to continuously transmitting or receiving as intended.  
 Note: ISM Band on TX Mode.

### 15.247(a)(1) Carrier Separation

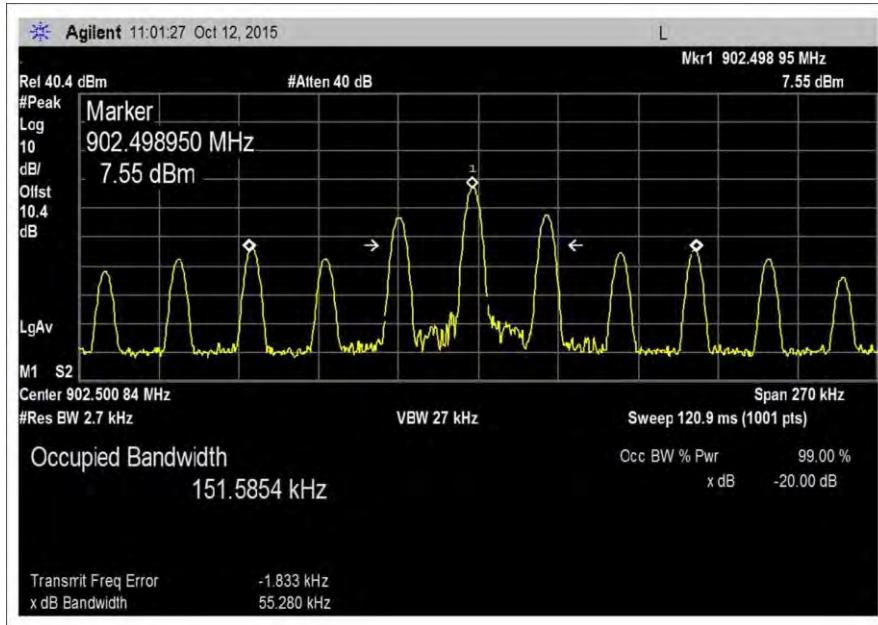
## Plot(s)



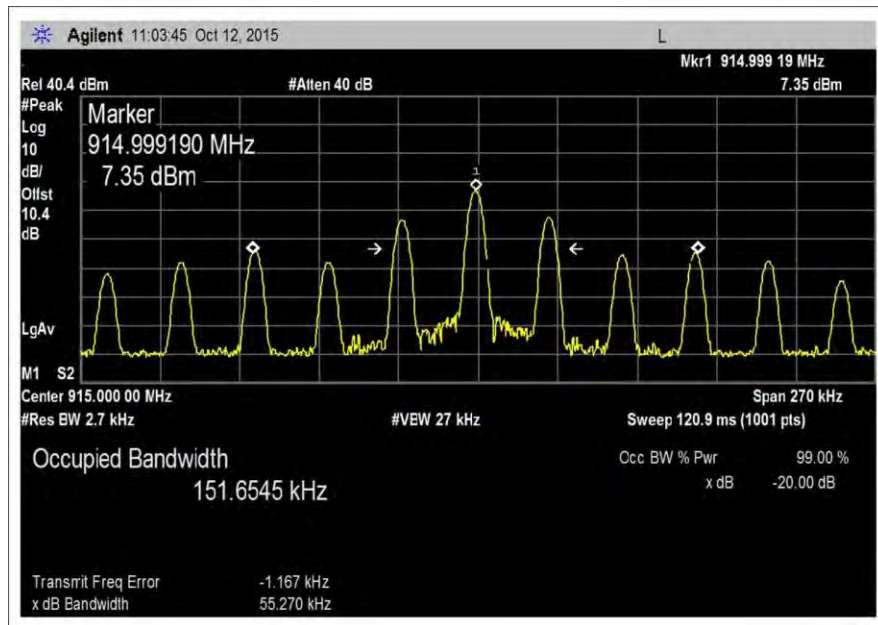


### 15.247(a)(1)(i) 20 dB Bandwidth

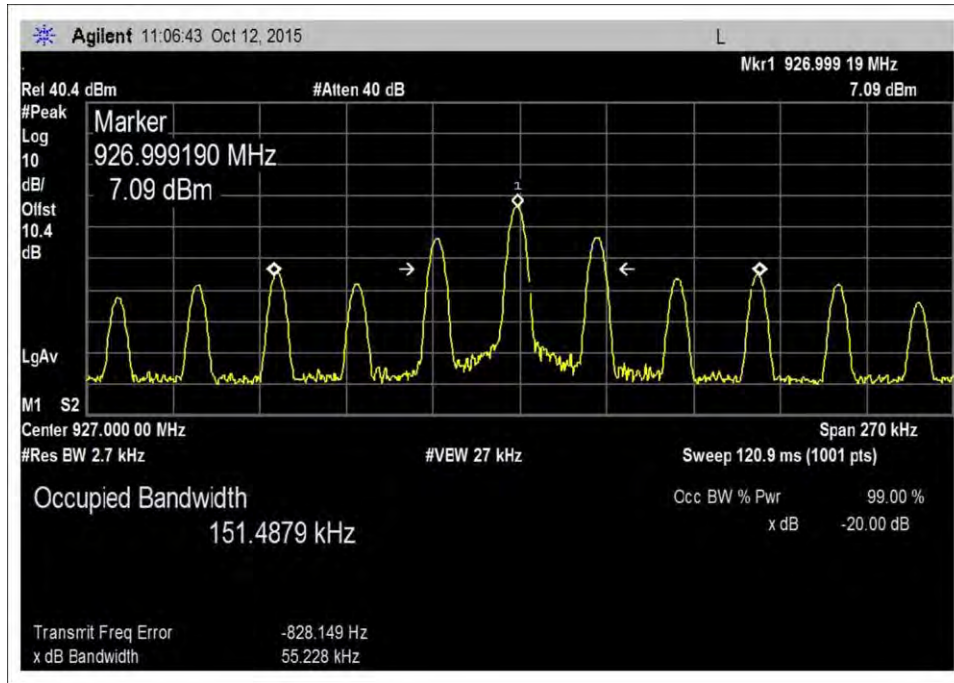
## Plot(s)



Low Channel



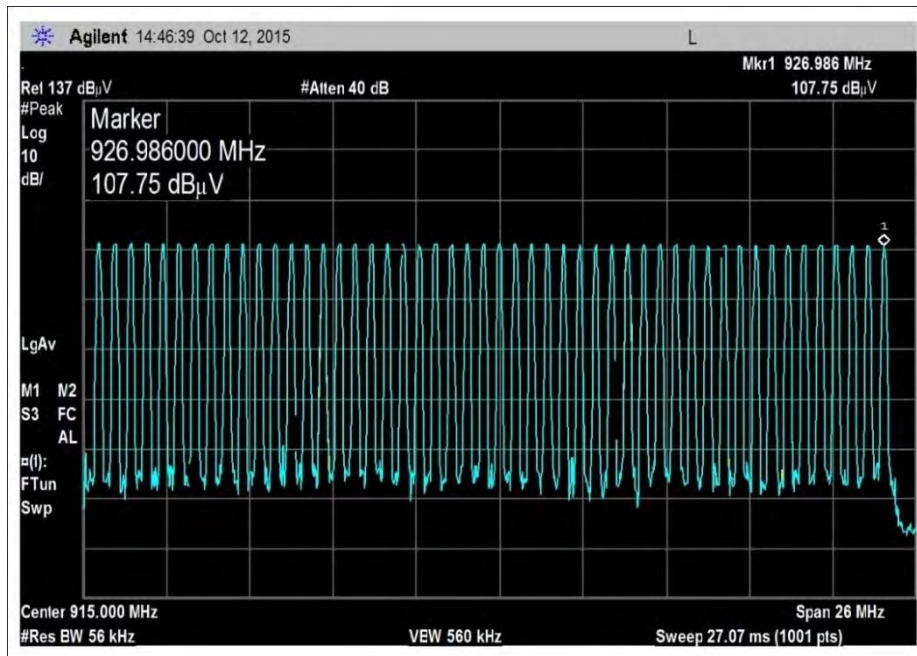
Middle Channel



High Channel

### 15.247(a)(1)(i) Number of Hopping Channels

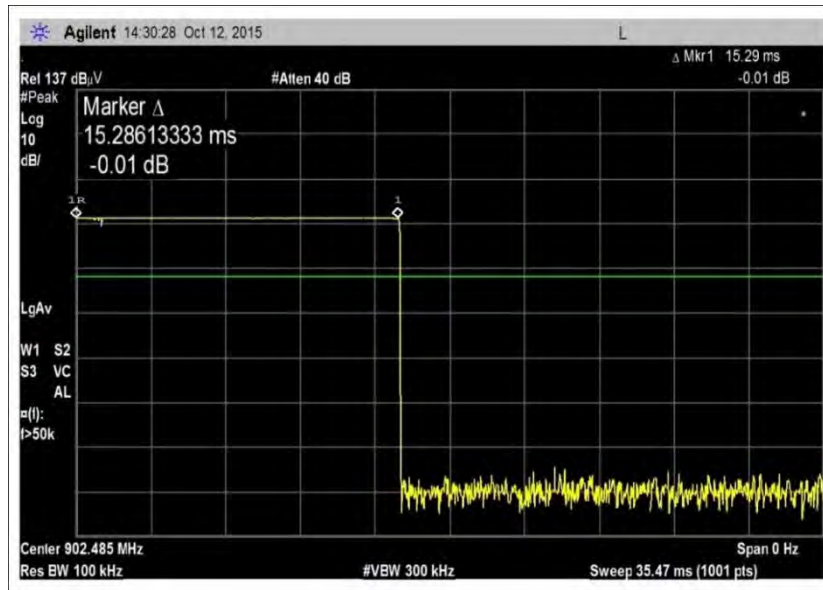
#### Plot(s)



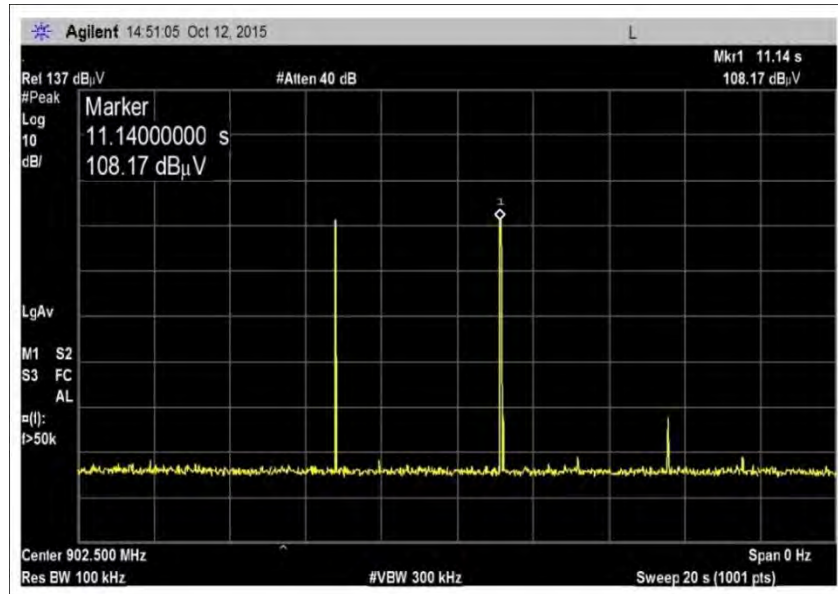
50 channels

### 15.247(a)(1)(i) Time of Occupancy

## Plot(s)

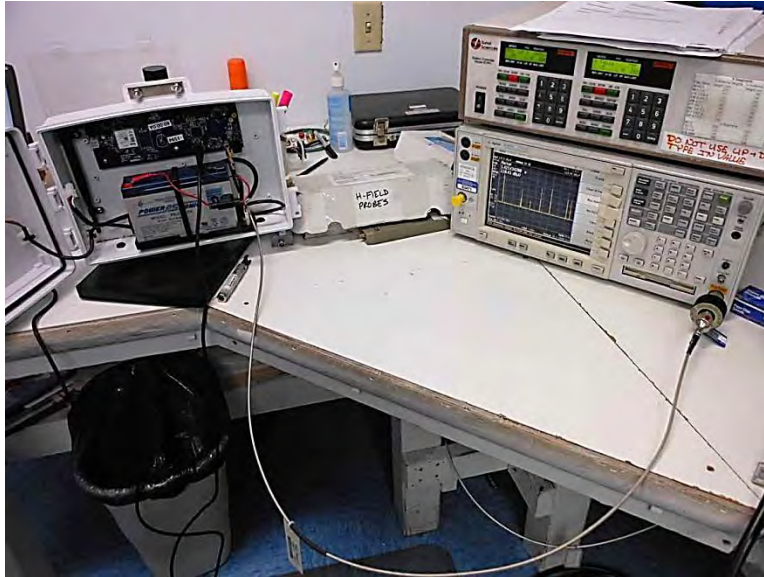


Dwell time =15.2861333ms



There are 2 events which occur in 20s  
 Limit: On time **shall not exceed 0.4 second** in 20s  
 Each events on time = 15.28613333ms  
 Therefore, total on time = 15.28613333sec x 2 events /sec = 30.57227ms = 0.0030572s

**Test Setup Photo(s)**



## 15.247(b) Output Power

### 15.247(b)(2) Peak Conducted Output Power

#### Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instrument**  
 Specification: **15.247(b)(2)- Power Output (902-928 MHz FHSS)**  
 Work Order #: **97540** Date: 10/16/2015  
 Test Type: **Conducted Power Measurement** Time:  
 Tested By: Hieu Song Nguyenpham Sequence#:  
 Software: EMITest 5.02.00

#### Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	P06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
T2	P01211	Attenuator	23-10-34	3/31/2015	3/31/2017
	03471	Spectrum Analyzer	E4440A	12/19/2013	12/19/2015

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Test Conditions / Notes:

15.247 (b)(2): Fundamental of the EUT

Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C 63.10 2009 section 6.10.1  
 RBW=1MHz  
 VBW=3MHz

The EUT is placed on the table and set to continuously transmitting or receiving as intended.  
 Note: ISM Band on TX Mode.

**15.31e: Power output tests were performed using new 6V battery.**



**Test Data Summary - Voltage Variations**

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instrument**  
 Specification: **15.31e**  
 Work Order #: **97540** Date: 10/16/2015  
 Test Type: **Conducted Power Measurement** Time:  
 Tested By: Hieu Song Nguyenpham Sequence#:  
 Software: EMITest 5.02.00

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	P06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
T2	P01211	Attenuator	23-10-34	3/31/2015	3/31/2017
	03471	Spectrum Analyzer	E4440A	12/19/2013	12/19/2015

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

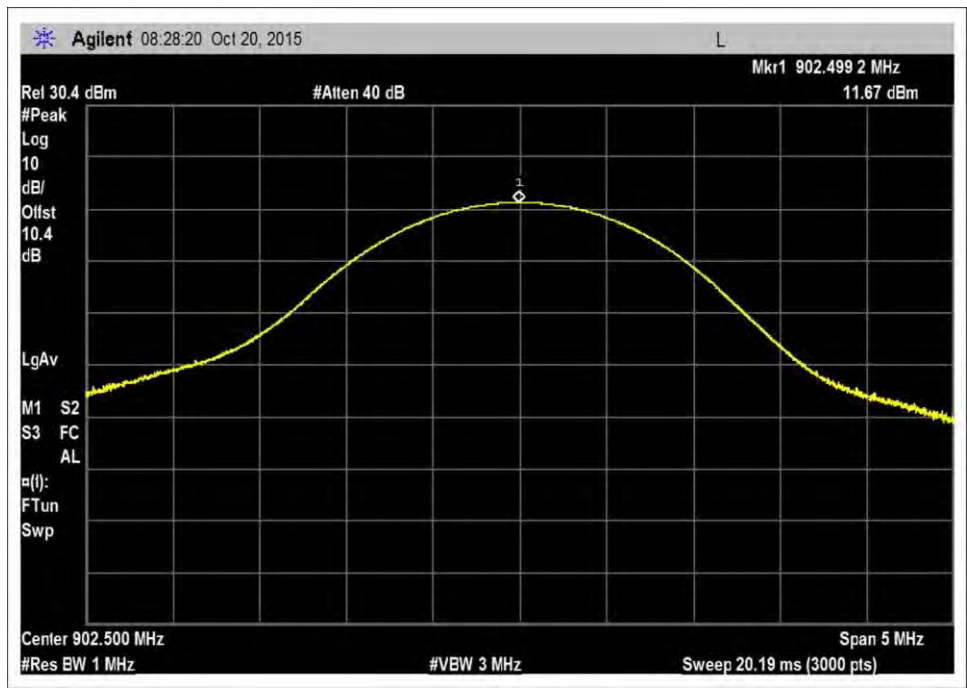
Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C 63.10 2009 section 6.10.1

The EUT is placed on the table and set to continuously transmitting or receiving as intended.

Note: ISM Band on TX Mode  
**15.31e: Power output tests were performed using new 6V battery.**

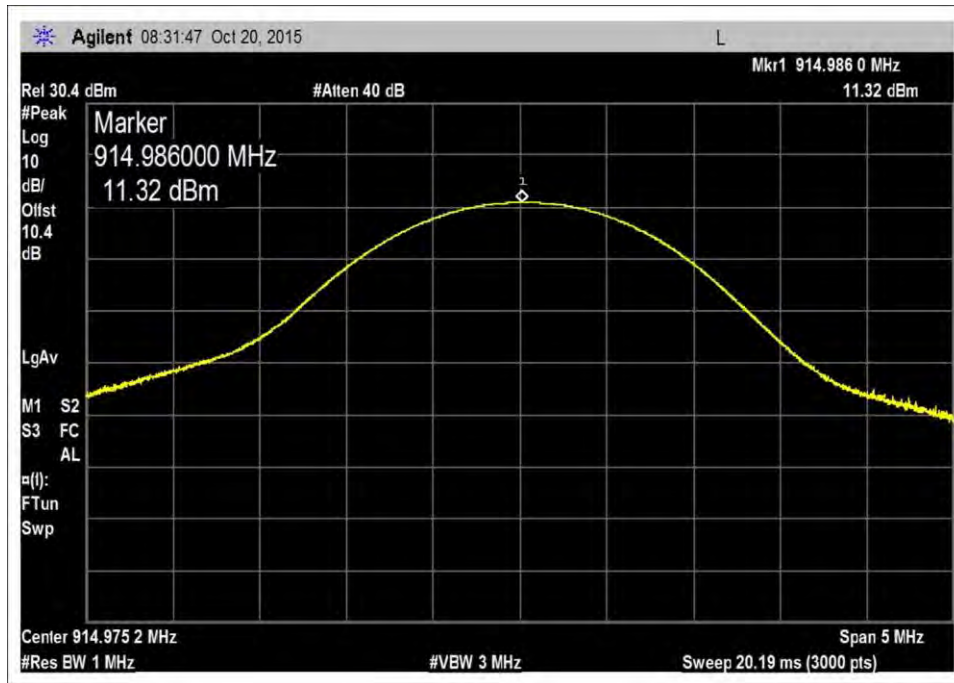
Test Data Summary - RF Conducted Measurement			
Frequency (MHz)	Measured Power in Watt	Power Limit in Watt	Pass/Fail
Low Channel 902.5	0.014689263	1.00	Pass
Middle Channel 915	0.013551894	1.00	Pass
High Channel 927	0.012793813	1.00	Pass

**Test Data**

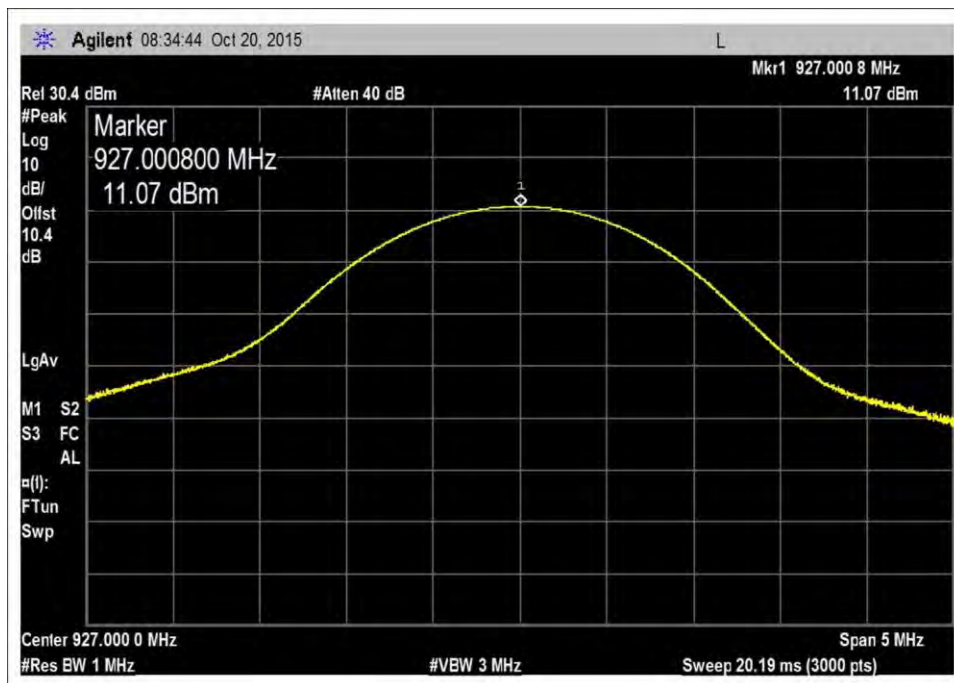


Low Channel



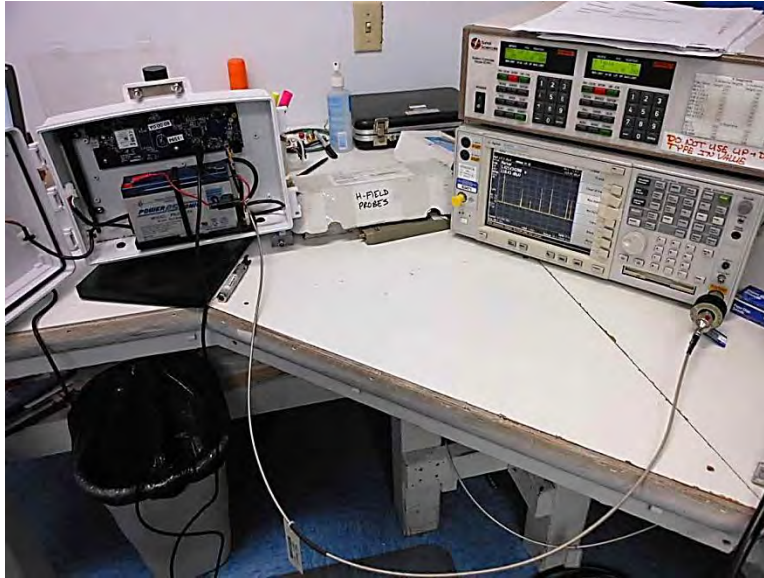


Middle Channel



High Channel

**Test Setup Photo(s)**



**15.247(d) Spurious Emissions & Band Edge**

**15.247(d) RF Conducted Emissions & Band Edge**

**Test Conditions / Setup / Test Data**

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) Conducted Spurious Emissions**  
 Work Order #: **97540** Date: 10/12/2015  
 Test Type: **Conducted Spurious Emission** Time: 1:29:24 PM  
 Tested By: Hieu Song Nguyenpham Sequence#: 3  
 Software: EMITest 5.02.00

*Equipment Tested:*

Device	Manufacturer	Model #	S/N
Configuration 1			

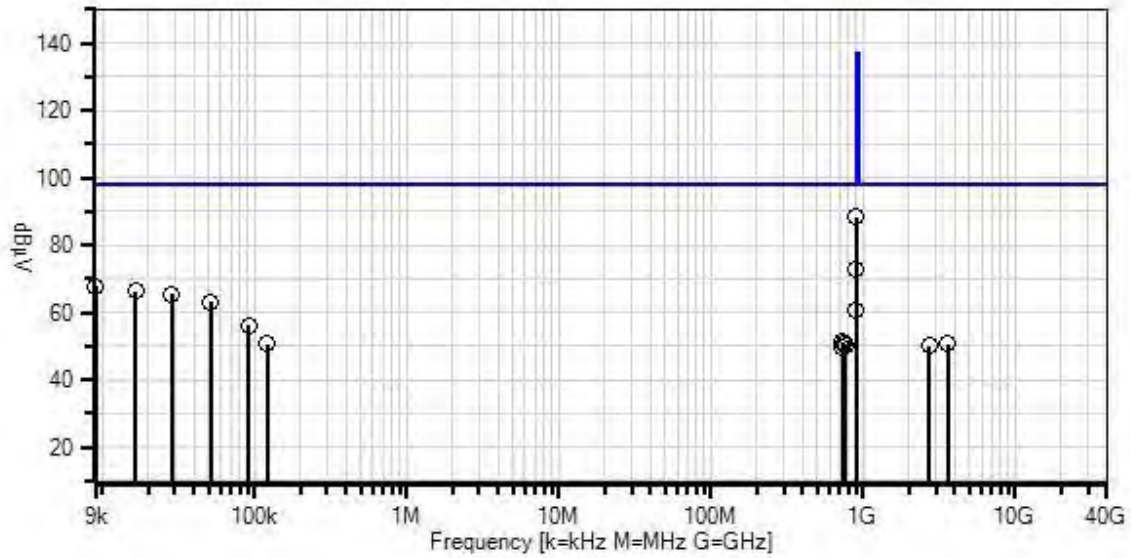
*Support Equipment:*

Device	Manufacturer	Model #	S/N
Configuration 1			

*Test Conditions / Notes:*

Conducted Spurious Emission  
 Frequency Range: 9kHz to 10000MHz  
  
 Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C63.10 2009 section 7.7.10  
  
 RBW=100kHz  
 VBW=300kHz  
  
 The EUT is connected straight to the spectrum analyzer and set to continuously transmitting as intended. The EUT is not connected to support devices.  
  
 Note: ISM Band on TX Mode.  
**Low Channel**

Davis Instruments WD#: 97540 Sequence#: 3 Date: 10/12/2015  
15.247(d) Conducted Spurious Emissions Test Distance: None



— Readings  
× QP Readings  
▼ Ambient  
○ Peak Readings  
\* Average Readings  
Software Version: 5.02.00  
1 - 15.247(d) Conducted Spurious Emissions

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015

**Measurement Data:**

Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	901.985M	77.9	+10.0	+0.4			+0.0	88.3	98.0	-9.7	None
2	901.128M	62.6	+10.0	+0.4			+0.0	73.0	98.0	-25.0	None
3	9.000k	57.9	+9.9	+0.0			+0.0	67.8	98.0	-30.2	None
4	16.618k	56.3	+9.9	+0.0			+0.0	66.2	98.0	-31.8	None
5	28.778k	55.4	+9.9	+0.0			+0.0	65.3	98.0	-32.7	None
6	51.644k	53.1	+9.9	+0.0			+0.0	63.0	98.0	-35.0	None
7	898.985M	50.3	+10.0	+0.4			+0.0	60.7	98.0	-37.3	None
8	92.026k	46.2	+9.9	+0.0			+0.0	56.1	98.0	-41.9	None
9	728.799M	40.7	+10.0	+0.4			+0.0	51.1	98.0	-46.9	None
10	742.516M	40.4	+10.0	+0.3			+0.0	50.7	98.0	-47.3	None
11	121.547k	40.6	+9.9	+0.0			+0.0	50.5	98.0	-47.5	None
12	3610.409M	39.6	+10.0	+0.9			+0.0	50.5	98.0	-47.5	None
13	760.092M	39.9	+10.0	+0.3			+0.0	50.2	98.0	-47.8	None
14	2707.905M	39.3	+10.0	+0.8			+0.0	50.1	98.0	-47.9	None
15	734.800M	39.6	+10.0	+0.3			+0.0	49.9	98.0	-48.1	None

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) Conducted Spurious Emissions**  
 Work Order #: **97540** Date: 10/12/2015  
 Test Type: **Conducted Spurious Emission** Time: 1:41:51 PM  
 Tested By: Hieu Song Nguyenpham Sequence#: 4  
 Software: EMITest 5.02.00

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Conducted Spurious Emission  
 Frequency Range: 9kHz to 10000MHz

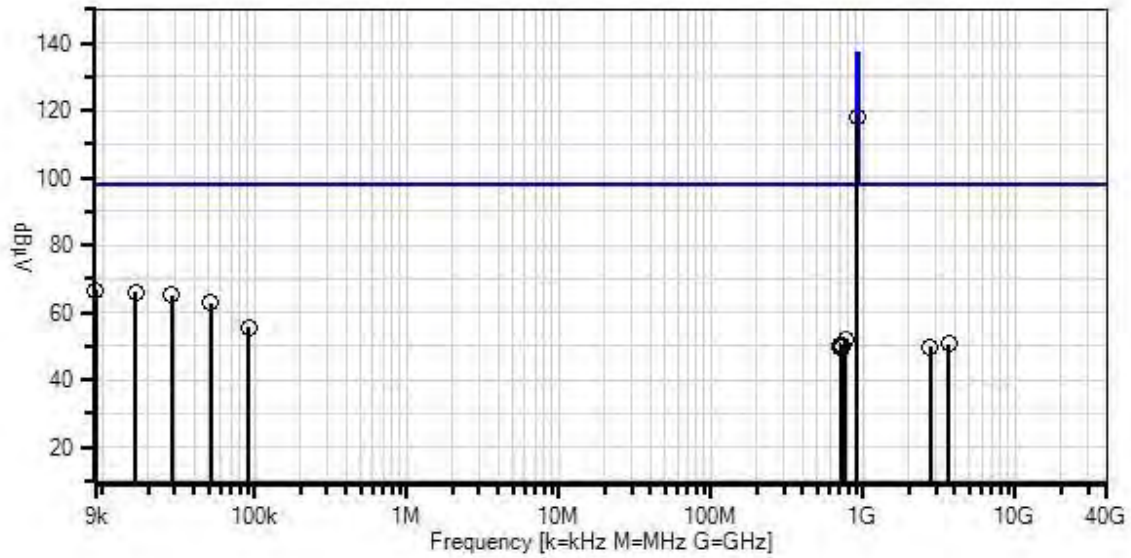
Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C63.10 2009 section 7.7.10

RBW=100kHz  
 VBW=300kHz

The EUT is connected straight to the spectrum analyzer and set to continuously transmitting as intended. The EUT is not connected to support devices.

Note: ISM Band  
**Middle Channel**

Davis Instruments WD#: 97540 Sequence#: 4 Date: 10/12/2015  
 15.247(d) Conducted Spurious Emissions Test Distance: None



- Readings
  - × QP Readings
  - ▼ Ambient
  - 1 - 15.247(d) Conducted Spurious Emissions
  - Peak Readings
  - \* Average Readings
- Software Version: 5.02.00



**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015

**Measurement Data:**

Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	914.846M	108.0	+9.9	+0.4			+0.0	118.3	137.0	-18.7	None
2	9.006k	56.7	+9.9	+0.0			+0.0	66.6	98.0	-31.4	None
3	16.517k	56.0	+9.9	+0.0			+0.0	65.9	98.0	-32.1	None
4	28.846k	55.1	+9.9	+0.0			+0.0	65.0	98.0	-33.0	None
5	51.483k	52.8	+9.9	+0.0			+0.0	62.7	98.0	-35.3	None
6	91.594k	45.8	+9.9	+0.0			+0.0	55.7	98.0	-42.3	None
7	766.951M	41.7	+10.0	+0.3			+0.0	52.0	98.0	-46.0	None
8	3659.261M	39.6	+10.0	+0.9			+0.0	50.5	98.0	-47.5	None
9	721.940M	39.9	+10.0	+0.4			+0.0	50.3	98.0	-47.7	None
10	705.221M	39.7	+10.0	+0.4			+0.0	50.1	98.0	-47.9	None
11	2744.829M	38.9	+10.0	+0.8			+0.0	49.7	98.0	-48.3	None
12	718.939M	39.2	+10.0	+0.4			+0.0	49.6	98.0	-48.4	None
13	708.222M	39.1	+10.0	+0.4			+0.0	49.5	98.0	-48.5	None
14	718.082M	39.1	+10.0	+0.4			+0.0	49.5	98.0	-48.5	None
15	720.225M	39.1	+10.0	+0.4			+0.0	49.5	98.0	-48.5	None



Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) Conducted Spurious Emissions**  
 Work Order #: **97540** Date: 10/12/2015  
 Test Type: **Conducted Spurious Emission** Time: 1:58:22 PM  
 Tested By: Hieu Song Nguyenpham Sequence#: 5  
 Software: EMITest 5.02.00

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Conducted Spurious Emission  
 Frequency Range: 9kHz to 10000MHz

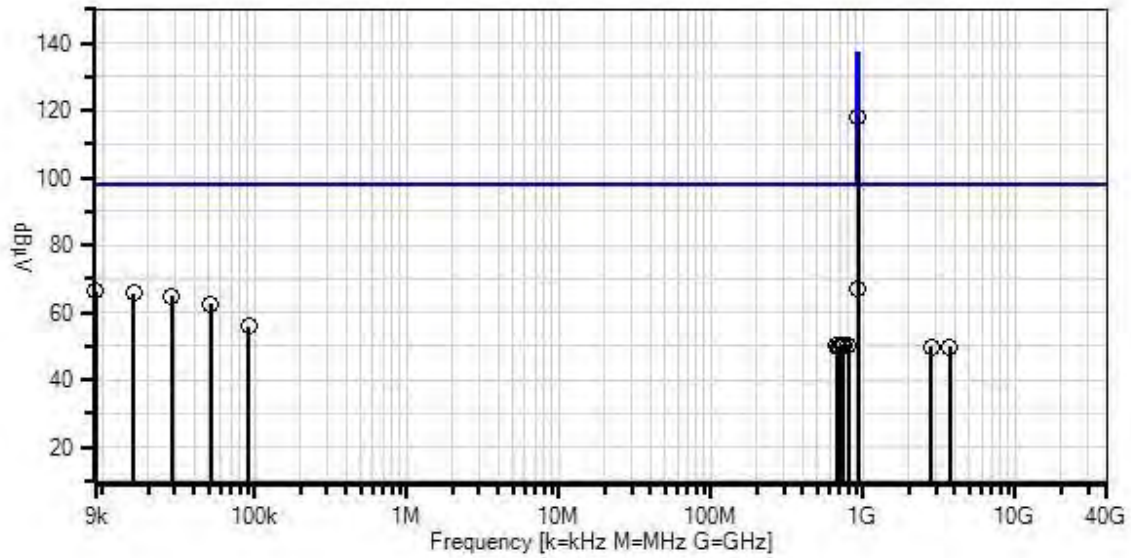
Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C63.10 2009 section 7.7.10

RBW=100kHz  
 VBW=300kHz

The EUT is connected straight to the spectrum analyzer and set to continuously transmitting as intended. The EUT is not connected to support devices.

Note: ISM Band  
**High Channel**

Davis Instruments WD#: 97540 Sequence#: 5 Date: 10/12/2015  
 15.247(d) Conducted Spurious Emissions Test Distance: None



- Readings
  - × QP Readings
  - ▼ Ambient
  - Peak Readings
  - \* Average Readings
- 1 - 15.247(d) Conducted Spurious Emissions  
 Software Version: 5.02.00

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015

**Measurement Data:**

Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	926.849M	107.7	+9.9	+0.3			+0.0	117.9	137.0	-19.1	None
2	928.564M	56.9	+9.9	+0.3			+0.0	67.1	98.0	-30.9	None
3	9.020k	56.4	+9.9	+0.0			+0.0	66.3	98.0	-31.7	None
4	16.100k	55.9	+9.9	+0.0			+0.0	65.8	98.0	-32.2	None
5	28.711k	55.0	+9.9	+0.0			+0.0	64.9	98.0	-33.1	None
6	51.443k	52.7	+9.9	+0.0			+0.0	62.6	98.0	-35.4	None
7	92.026k	46.0	+9.9	+0.0			+0.0	55.9	98.0	-42.1	None
8	736.086M	39.9	+10.0	+0.3			+0.0	50.2	98.0	-47.8	None
9	666.211M	39.7	+10.0	+0.4			+0.0	50.1	98.0	-47.9	None
10	797.816M	39.7	+10.0	+0.4			+0.0	50.1	98.0	-47.9	None
11	717.653M	39.6	+10.0	+0.4			+0.0	50.0	98.0	-48.0	None
12	2780.385M	39.1	+10.0	+0.8			+0.0	49.9	98.0	-48.1	None
13	700.077M	39.4	+10.0	+0.4			+0.0	49.8	98.0	-48.2	None
14	3708.113M	38.9	+10.0	+0.9			+0.0	49.8	98.0	-48.2	None
15	679.929M	39.3	+10.0	+0.4			+0.0	49.7	98.0	-48.3	None

**Band Edge Test Setup / Conditions**

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instrument**  
 Specification: **Band Edge Set up**  
 Work Order #: **97540** Date: 10/16/2015  
 Test Type: **Conducted Power Measurement** Time:  
 Tested By: Hieu Song Nguyenpham Sequence#:  
 Software: EMITest 5.02.00

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	P06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
T2	P01211	Attenuator	23-10-34	3/31/2015	3/31/2017
	03471	Spectrum Analyzer	E4440A	12/19/2013	12/19/2015

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

Band edge Set up

Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.

Temperature: 22.3°C

Relative Humidity: 39 %

Atmospheric Pressure: 101.2 kPa

High Clock: 40MHz

Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth

Transmitting operating frequency= 902.5, 915 and 927MHz for ISM

Gain of the antenna for Bluetooth= 1dBi

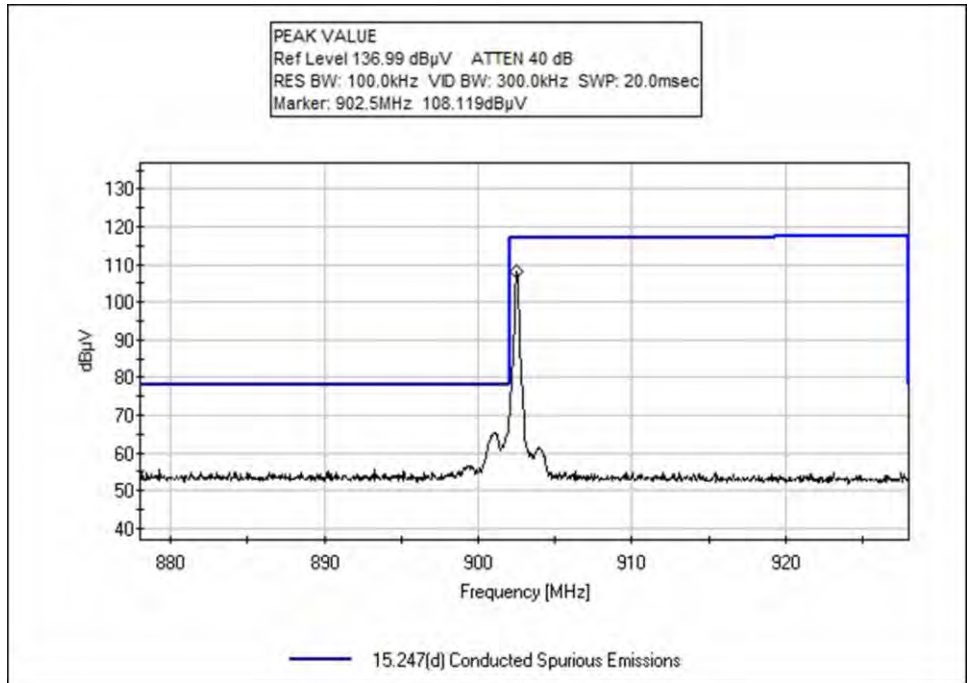
Gain of the antenna for ISM= 2dBi

Method: ANSI C 63.10 2009 section 7.7.9

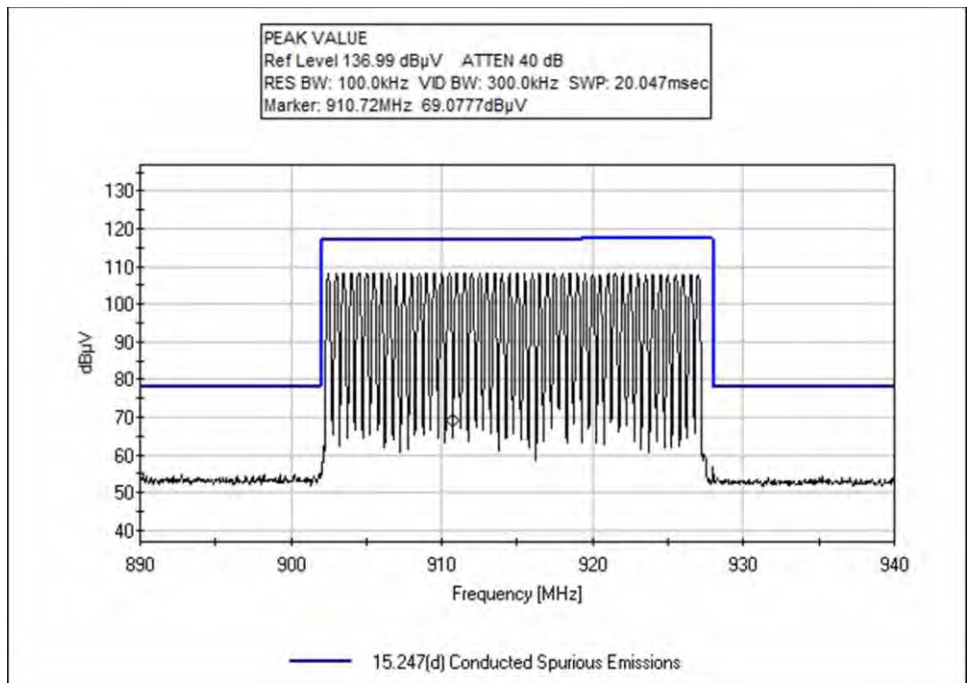
The EUT is placed on the table and set to continuously transmitting or receiving as intended.

Note: ISM Band on TX Mode

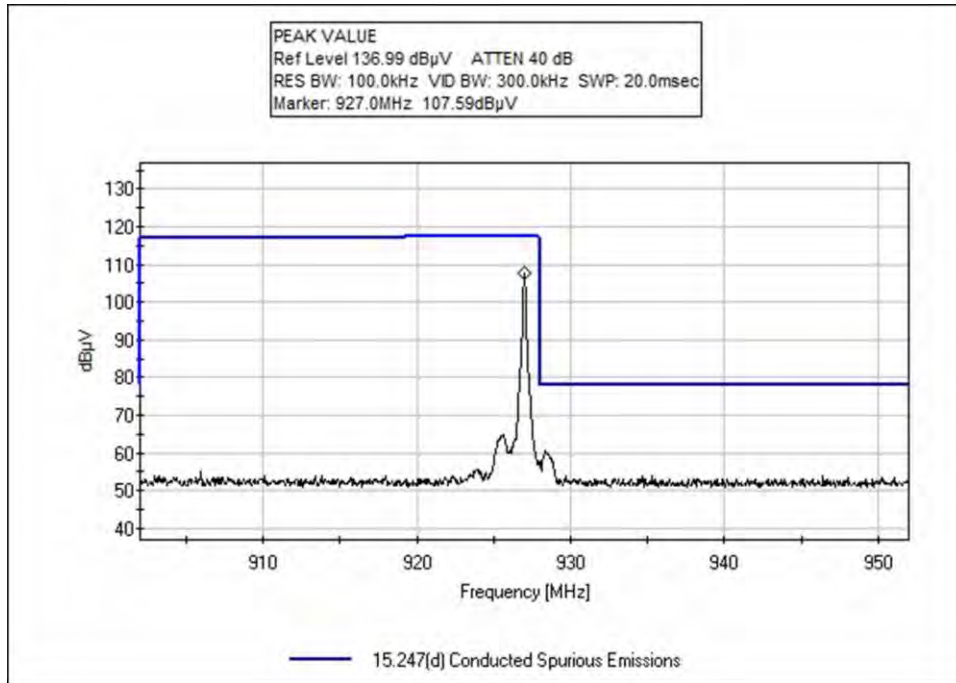
## Band Edge Plots



Low Channel

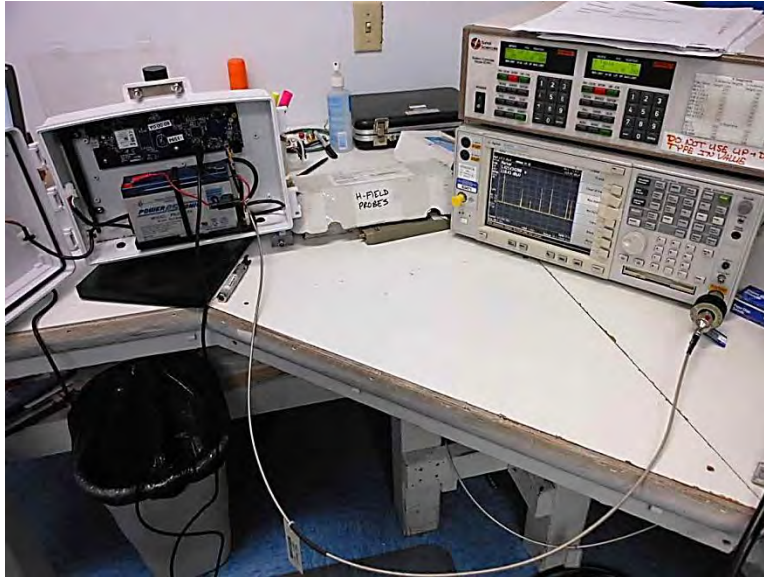


Hopping



High Channel

**Test Setup Photo(s)**





## 15.247(d) Radiated Emissions & Band Edge

### Test Conditions / Setup / Test Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **97540** Date: 10/14/2015  
 Test Type: **Radiated Scan** Time: 17:47:13  
 Tested By: Hieu Song Nguyenpham Sequence#: 68  
 Software: EMITest 5.02.00

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Support Equipment:

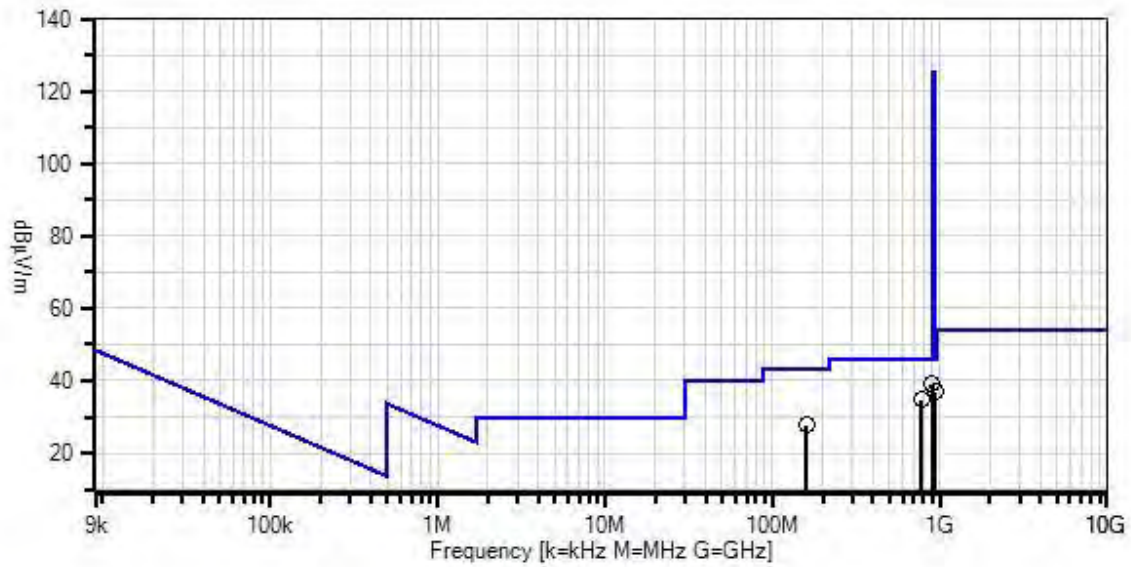
Device	Manufacturer	Model #	S/N
Configuration 1			

#### Test Conditions / Notes:

Radiated Spurious Emission  
 Frequency Range: 9kHz to 1000MHz  
  
 Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C 63.4 2009  
  
 Frequency range of measurement = 9 kHz- 10GHz.  
 9 kHz - 150 kHz -> RBW=200 Hz VBW=200 Hz  
 150 kHz - 30 MHz -> RBW=9 kHz VBW=9 kHz  
 30 MHz - 1000MHz -> RBW=120 kHz VBW=120 kHz  
 1000MHz to 10000MHz-> RBW =1MHz VBW=1MHz  
  
 The EUT is operated at 6 VDC by Battery and set to continuously transmitting as intended. The EUT is not connected to any support devices.  
  
 Note: ISM on TX Mode.  
**Low Channel**



Davis Instruments WO#: 97540 Sequence#: 68 Date: 10/14/2015  
 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: 5.02.00

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T1	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T3	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T4	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T5	AN00567	Preamp	8447D	1/2/2015	1/2/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	896.188M	38.7	+23.2 -28.0	+3.1	+0.7	+1.4	+0.0	39.1	46.0	-6.9	Vert
2	942.523M	35.6	+23.8 -27.9	+3.2	+0.7	+1.4	+0.0	36.8	46.0	-9.2	Vert
3	776.788M	36.2	+21.6 -28.0	+2.9	+0.7	+1.3	+0.0	34.7	46.0	-11.3	Vert
4	160.693M	43.1	+10.6 -27.8	+1.2	+0.2	+0.5	+0.0	27.8	43.5	-15.7	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **97540** Date: 10/14/2015  
 Test Type: **Radiated Scan** Time: 18:26:04  
 Tested By: Hieu Song Nguyenpham Sequence#: 71  
 Software: EMITest 5.02.00

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

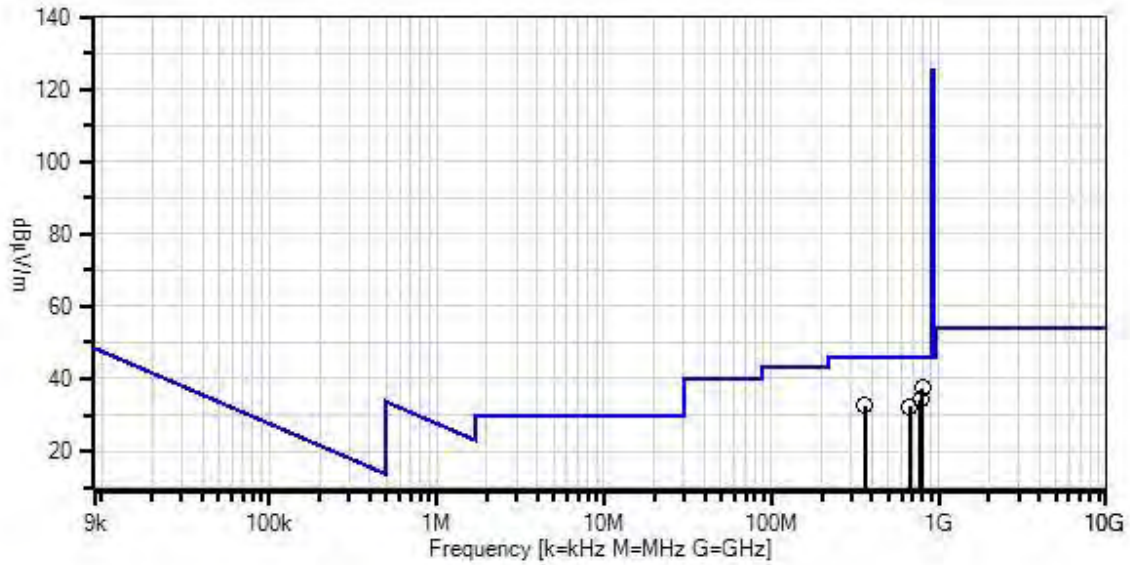
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

Radiated Spurious Emission  
 Frequency Range: 9kHz to 1000MHz  
  
 Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C 63.4 2009  
  
 Frequency range of measurement = 9 kHz- 10GHz.  
 9 kHz - 150 kHz -> RBW=200 Hz VBW=200 Hz  
 150 kHz - 30 MHz -> RBW=9 kHz VBW=9 kHz  
 30 MHz - 1000MHz -> RBW=120 kHz VBW=120 kHz  
 1000MHz to 10000MHz-> RBW =1MHz VBW=1MHz  
  
 The EUT is operated at 6 VDC by Battery and set to continuously transmitting as intended. The EUT is not connected to any support devices.  
  
 Note: ISM on TX Mode  
**Middle Channel**

Davis Instruments WO#: 97540 Sequence#: 71 Date: 10/14/2015  
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
  - × QP Readings
  - ▼ Ambient
  - Peak Readings
  - \* Average Readings
- 1 - 15.247(d) / 15.209 Radiated Spurious Emissions  
 Software Version: 5.02.00

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T1	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T3	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T4	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T5	AN00567	Preamp	8447D	1/2/2015	1/2/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	797.414M	38.6	+21.9 -28.0	+2.9	+0.7	+1.3	+0.0	37.4	46.0	-8.6	Horiz
2	782.235M	35.6	+21.7 -28.0	+2.9	+0.7	+1.3	+0.0	34.2	46.0	-11.8	Vert
3	360.052M	42.3	+15.3 -28.0	+1.9	+0.4	+0.8	+0.0	32.7	46.0	-13.3	Horiz
4	670.141M	35.5	+20.2 -28.0	+2.7	+0.7	+1.2	+0.0	32.3	46.0	-13.7	Vert

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **97540** Date: 10/14/2015  
 Test Type: **Radiated Scan** Time: 18:56:42  
 Tested By: Hieu Song Nguyenpham Sequence#: 74  
 Software: EMITest 5.02.00

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

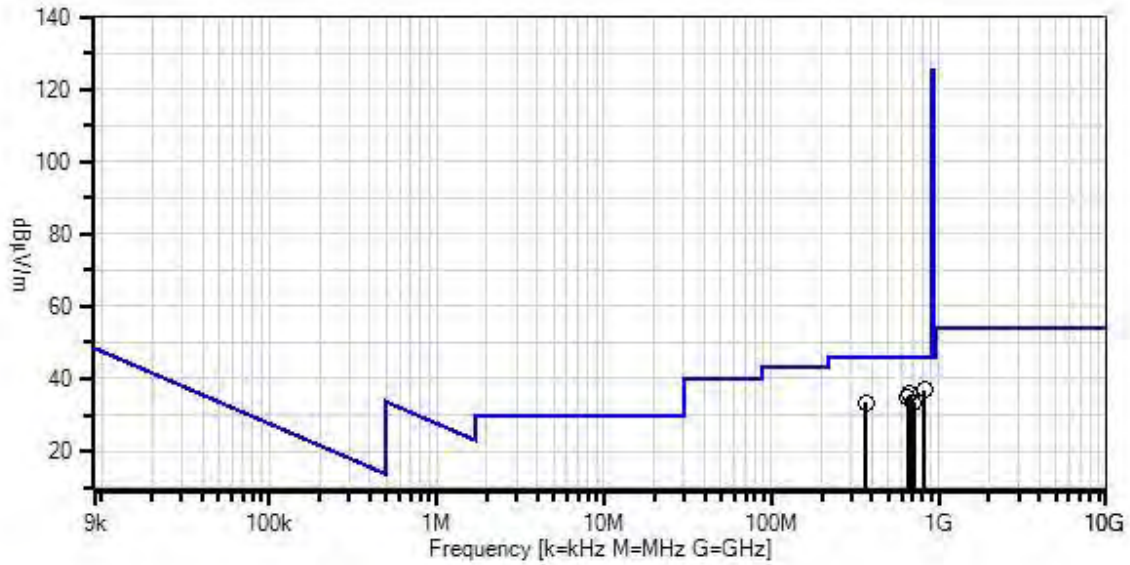
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

Radiated Spurious Emission  
 Frequency Range: 9kHz to 1000MHz  
  
 Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C 63.4 2009  
  
 Frequency range of measurement = 9 kHz- 10GHz.  
 9 kHz - 150 kHz -> RBW=200 Hz VBW=200 Hz  
 150 kHz - 30 MHz -> RBW=9 kHz VBW=9 kHz  
 30 MHz - 1000MHz -> RBW=120 kHz VBW=120 kHz  
 1000MHz to 10000MHz-> RBW =1MHz VBW=1MHz  
  
 The EUT is operated at 6 VDC by Battery and set to continuously transmitting as intended. The EUT is not connected to any support devices.  
  
 Note: ISM on TX Mode  
**High Channel**

Davis Instruments WO#: 97540 Sequence#: 74 Date: 10/14/2015  
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
  - × QP Readings
  - ▼ Ambient
  - Peak Readings
  - \* Average Readings
- 1 - 15.247(d) / 15.209 Radiated Spurious Emissions
- Software Version: 5.02.00

**Test Equipment:**

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T1	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T3	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T4	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T5	AN00567	Preamp	8447D	1/2/2015	1/2/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	815.513M	37.8	+22.1 -28.0	+3.0	+0.7	+1.3	+0.0	36.9	46.0	-9.1	Horiz
2	671.893M	39.0	+20.3 -28.0	+2.7	+0.7	+1.2	+0.0	35.9	46.0	-10.1	Horiz
3	653.794M	38.3	+20.1 -28.0	+2.6	+0.6	+1.1	+0.0	34.7	46.0	-11.3	Vert
4	366.855M	42.9	+15.5 -28.0	+1.9	+0.4	+0.8	+0.0	33.5	46.0	-12.5	Horiz
5	706.922M	36.1	+20.6 -28.0	+2.9	+0.7	+1.2	+0.0	33.5	46.0	-12.5	Vert



Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **97540** Date: 10/12/2015  
 Test Type: **Radiated Scan** Time: 16:47:45  
 Tested By: Hieu Song Nguyenpham Sequence#: 8  
 Software: EMITest 5.02.00

***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 10000MHz

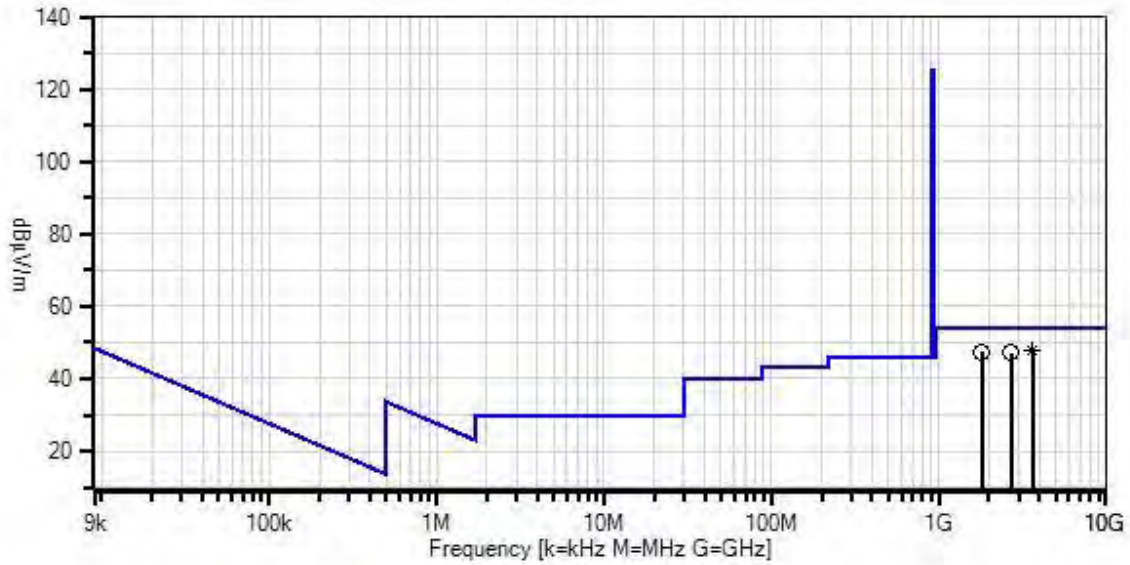
Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C63. 10 2009

Frequency range of measurement = 9 kHz- 10GHz.  
 9 kHz - 150 kHz -> RBW=200 Hz VBW=200 Hz  
 150 kHz - 30 MHz -> RBW=9 kHz VBW=9 kHz  
 30 MHz - 1000MHz -> RBW=120 kHz VBW=120 kHz  
 1000MHz to 10000MHz-> RBW =1MHz VBW=1MHz

The EUT is operated at 6 VDC by Battery and set to continuously transmitting as intended. The EUT is not connected to any support devices.

Note: ISM Band  
**Low Channel**

Davis Instruments WO#: 97540 Sequence#: 8 Date: 10/12/2015  
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
  - × QP Readings
  - ▼ Ambient
  - Peak Readings
  - \* Average Readings
- Software Version: 5.02.00
- 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

**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	AN02157	Horn Antenna-ANSI C63.5 Calibration	3115	12/2/2014	12/2/2016
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/24/2014	3/24/2016
T4	ANP01210	Cable	FSJIP-50A-4A	1/15/2015	1/15/2017
T5	ANP06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T6	AN03172	High Pass Filter	HM1155-11SS	1/15/2014	1/15/2016

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	T5	T6	T3	T4	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	3609.965M	69.6	-58.7	+31.4	+1.4	+3.2	+0.0	47.9	54.0	-6.1	Vert
	Ave		+0.9	+0.1							
^	3609.965M	76.6	-58.7	+31.4	+1.4	+3.2	+0.0	54.9	54.0	+0.9	Vert
			+0.9	+0.1							
3	1804.804M	74.7	-58.3	+26.9	+1.0	+2.2	+0.0	47.4	54.0	-6.6	Vert
			+0.6	+0.3							
4	2707.500M	71.5	-58.5	+29.2	+1.2	+2.7	+0.0	47.1	54.0	-6.9	Horiz
			+0.8	+0.2							

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **97540** Date: 10/12/2015  
 Test Type: **Radiated Scan** Time: 17:37:56  
 Tested By: Hieu Song Nguyenpham Sequence#: 11  
 Software: EMITest 5.02.00

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

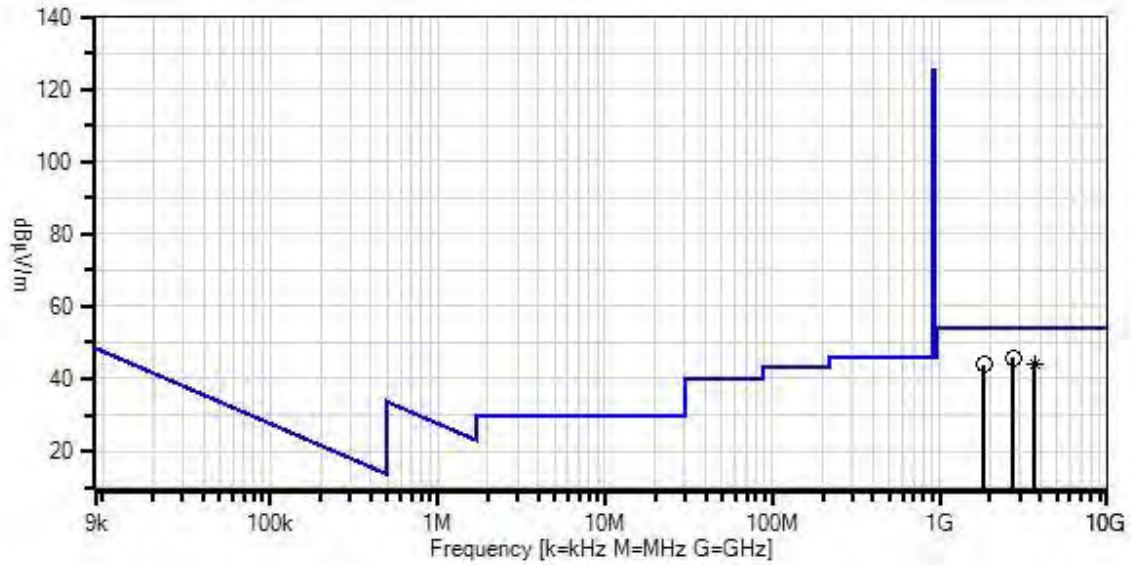
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

Radiated Spurious Emission  
 Frequency Range: 1000MHz to 10000MHz  
  
 Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C63. 10 2009  
  
 Frequency range of measurement = 9 kHz- 1GHz.  
 9 kHz - 150 kHz -> RBW=200 Hz VBW=200 Hz  
 150 kHz - 30 MHz -> RBW=9 kHz VBW=9 kHz  
 30 MHz - 1000MHz -> RBW=120 kHz VBW=120 kHz  
 1000MHz to 10000MHz-> RBW =1MHz VBW=1MHz  
  
 The EUT is an Environmonitor Gateway. It is operated at 6 VDC by Battery and set to continuously transmitting as intended. The EUT is not connected to any support devices.  
  
 Note: ISM Band  
**Middle Channel**

Davis Instruments WO#: 97540 Sequence#: 11 Date: 10/12/2015  
 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: 5.02.00

**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	AN02157	Horn Antenna-ANSI C63.5 Calibration	3115	12/2/2014	12/2/2016
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	ANP06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T6	AN03172	High Pass Filter	HM1155-11SS	1/15/2014	1/15/2016

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	T5	T6			Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	2744.743M	70.2	-58.5 +0.8	+29.1 +0.2	+1.2	+2.7	+0.0	45.7	54.0	-8.3	Horiz
2	3659.657M	65.6	-58.8 +0.9	+31.7 +0.1	+1.4	+3.2	+0.0	44.1	54.0	-9.9	Horiz
^	3659.657M	73.6	-58.8 +0.9	+31.7 +0.1	+1.4	+3.2	+0.0	52.1	54.0	-1.9	Horiz
4	1829.829M	71.0	-58.2 +0.6	+27.0 +0.3	+1.0	+2.2	+0.0	43.9	54.0	-10.1	Horiz

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instruments**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **97540** Date: 10/12/2015  
 Test Type: **Radiated Scan** Time: 18:16:05  
 Tested By: Hieu Song Nguyenpham Sequence#: 14  
 Software: EMITest 5.02.00

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

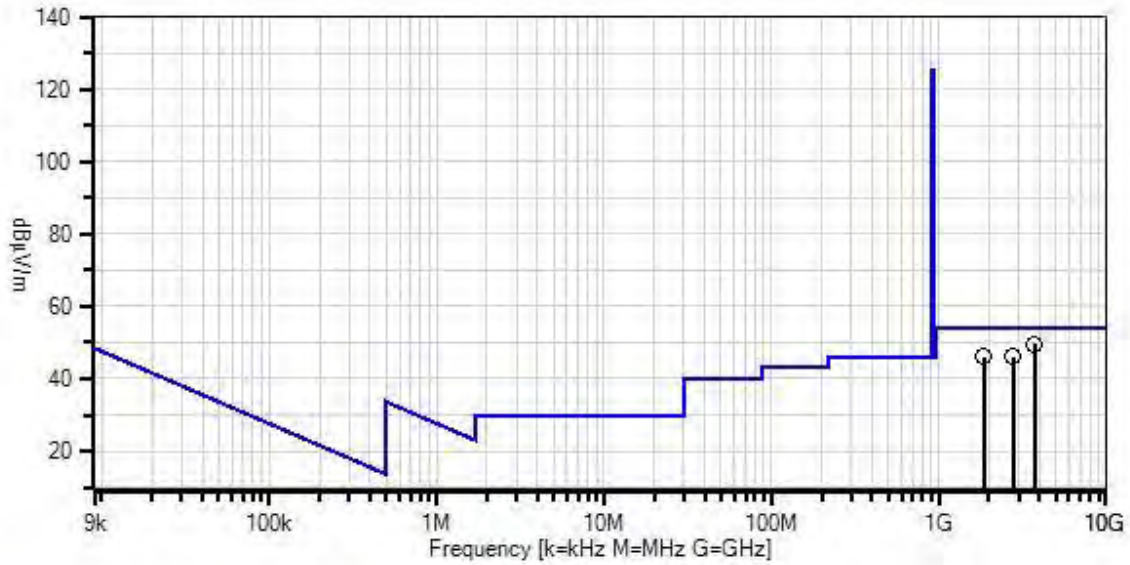
**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

Radiated Spurious Emission  
 Frequency Range: 1000MHz to 10000MHz  
  
 Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.  
 Temperature: 22.3°C  
 Relative Humidity: 39 %  
 Atmospheric Pressure: 101.2 kPa  
 High Clock: 40MHz  
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth  
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM  
 Gain of the antenna for Bluetooth= 1dBi  
 Gain of the antenna for ISM= 2dBi  
 Method: ANSI C63. 10 2009  
  
 Frequency range of measurement = 9 kHz- 10GHz.  
 9 kHz - 150 kHz -> RBW=200 Hz VBW=200 Hz  
 150 kHz - 30 MHz -> RBW=9 kHz VBW=9 kHz  
 30 MHz - 1000MHz -> RBW=120 kHz VBW=120 kHz  
 1000MHz to 10000MHz-> RBW =1MHz VBW=1MHz  
  
 The EUT is operated at 6 VDC by Battery and set to continuously transmitting as intended. The EUT is not connected to any support devices.  
  
 Note: ISM on TX Mode  
**High Channel**

Davis Instruments WO#: 97540 Sequence#: 14 Date: 10/12/2015  
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
  - × QP Readings
  - ▼ Ambient
  - Peak Readings
  - \* Average Readings
- Software Version: 5.02.00
- 1 - 15.247(d) / 15.209 Radiated Spurious Emissions



**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	AN02157	Horn Antenna-ANSI C63.5 Calibration	3115	12/2/2014	12/2/2016
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/24/2014	3/24/2016
T4	ANP01210	Cable	FSJIP-50A-4A	1/15/2015	1/15/2017
T5	ANP06712	Cable	32022-29094K-29094K-48TC	9/18/2014	9/18/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T6	AN03172	High Pass Filter	HM1155-11SS	1/15/2014	1/15/2016

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	Reading listed by margin.				Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
			T1 T5 dB	T2 T6 dB	T3 dB	T4 dB					
1	3707.705M	70.8	-58.8 +0.9	+32.0 +0.1	+1.5	+3.2	+0.0	49.7	54.0	-4.3	Horiz
2	2780.779M	70.4	-58.5 +0.8	+29.1 +0.2	+1.3	+2.8	+0.0	46.1	54.0	-7.9	Horiz
3	1853.853M	73.0	-58.3 +0.6	+27.2 +0.3	+1.0	+2.2	+0.0	46.0	54.0	-8.0	Horiz

## Band Edge Test Setup/ Conditions

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170  
 Customer: **Davis Instrument**  
 Specification: **Band Edge Set up**  
 Work Order #: **97540** Date: 10/16/2015  
 Test Type: **Radiated Measurement** Time:  
 Tested By: Hieu Song Nguyenpham Sequence#:  
 Software: EMITest 5.02.00

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	00567	Preamp	8447D	1/2/2015	1/2/2017
T5	P01187	Cable	CNT-195	12/30/2014	12/30/2016
	03471	Spectrum Analyzer	E4440A	12/19/2013	12/19/2015

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

Band edge Set up

Application: Tera-Term version 4.68 as a terminal Program for ISM radio and Nordic Master Control panel version 1.17 for BTLE module.

Temperature: 22.3°C

Relative Humidity: 39 %

Atmospheric Pressure: 101.2kPa

High Clock: 40MHz

Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth

Transmitting operating frequency= 902.5, 915 and 927MHz for ISM

Gain of the antenna for Bluetooth= 1dBi

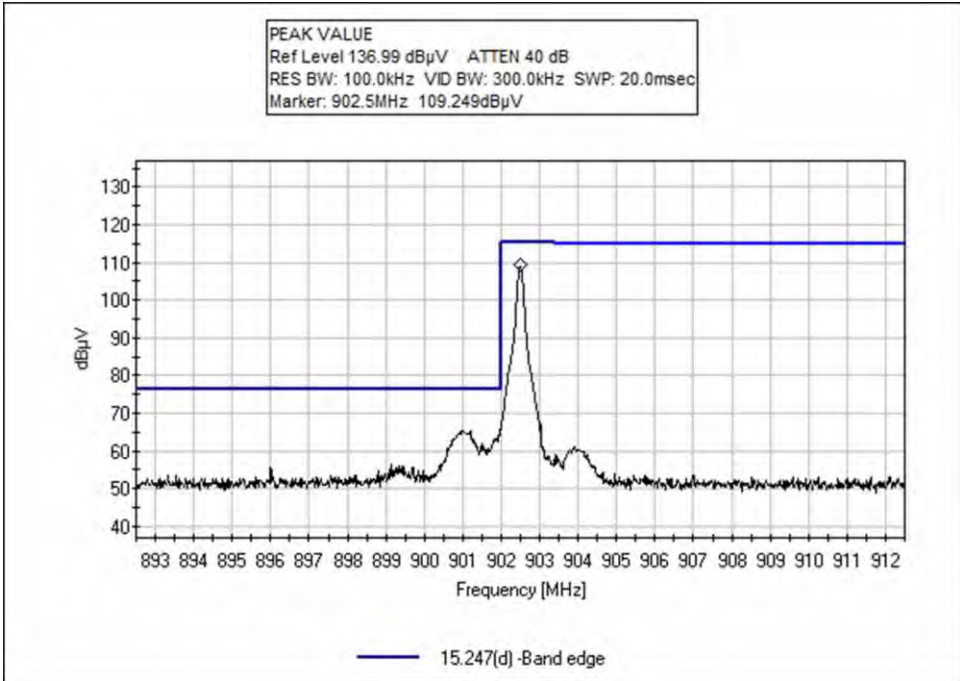
Gain of the antenna for ISM= 2dBi

Method: ANSI C 63.10 2009 section 7.7.9

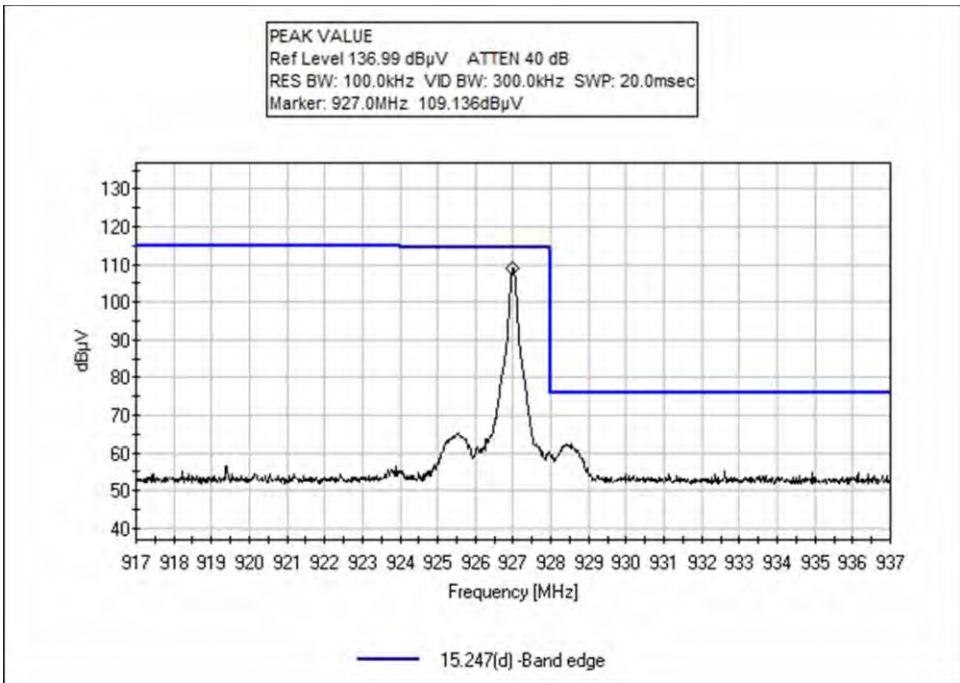
The EUT is placed on the table and set to continuously transmitting or receiving as intended.

Note: ISM Band on TX Mode

## Band Edge Plots

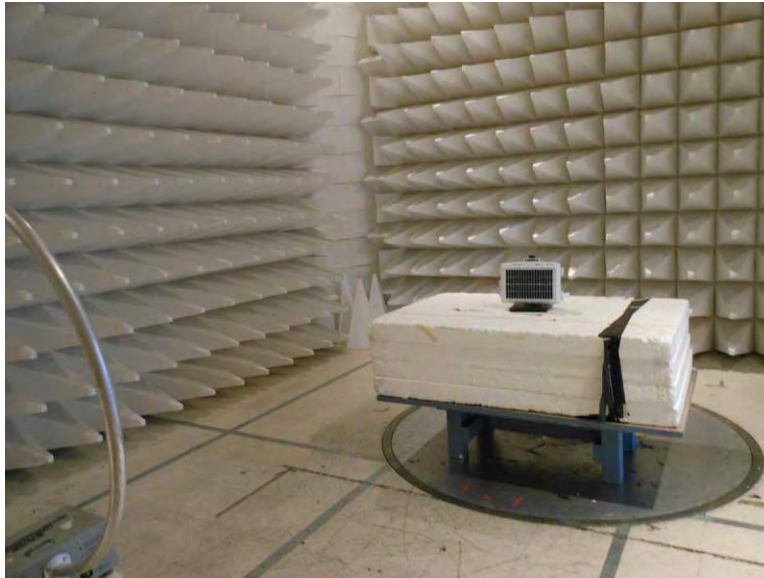


Low Channel

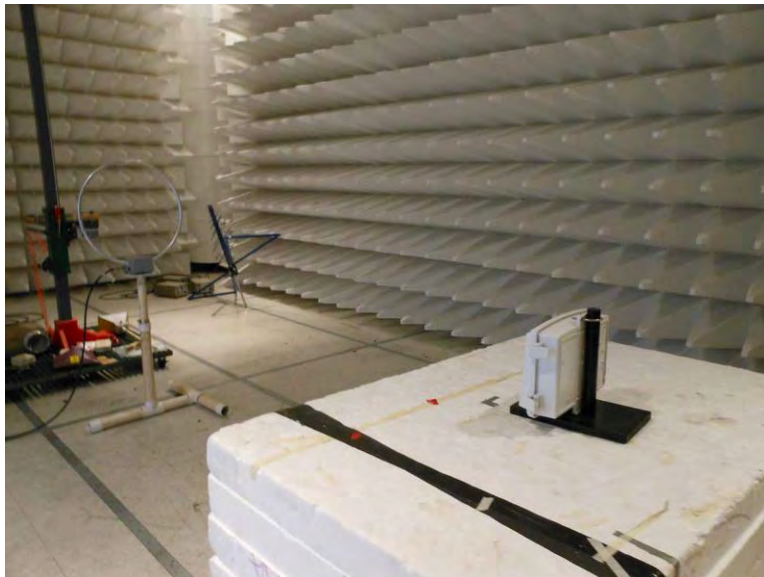


High Channel

**Test Setup Photo(s)**



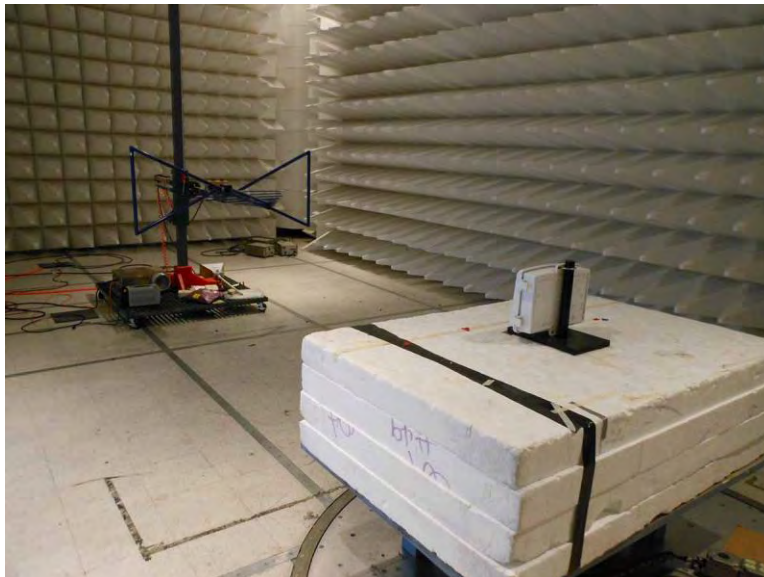
9kHz-30MHz



9kHz-30MHz



30MHz-1GHz

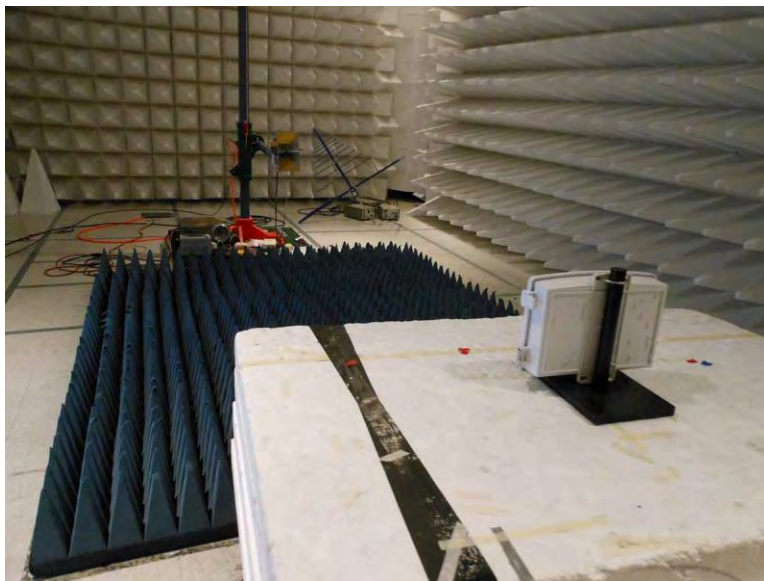


30MHz-1GHz





1-10GHz



1-10GHz

## SUPPLEMENTAL INFORMATION

### 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 dB $\mu$ V/m, the spectrum analyzer reading in dB $\mu$ V was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dB $\mu$ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB $\mu$ V/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 carrot ("^") 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.