

Davis Instruments

TEST REPORT FOR

**EnviroMonitor Node
Model: 6810**

Tested To The Following Standards:

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

Report No.: 97253-12

Date of issue: December 7, 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.

TABLE OF CONTENTS

Administrative Information	3
Test Report Information	3
Report Authorization	3
Test Facility Information	4
Software Versions	4
Site Registration & Accreditation Information	4
Summary of Results	5
Modifications During Testing	5
Conditions During Testing	5
Equipment Under Test	6
FCC Part 15 Subpart C	7
15.247(a) Fundamental Characteristics	7
15.247(a)(1) Carrier Separation	7
15.247(a)(1)(i) 20 dB Bandwidth	9
15.247(a)(1)(i) Number of Channels	11
15.247(a)(1)(i) Time of Occupancy	12
15.247(b) Output Power	16
15.247(b)(2) Peak Conducted Output Power	16
15.247(d) Spurious Emissions & Band Edge	21
15.247(d) RF Conducted Emissions & Band Edge	21
15.247(d) Radiated Emissions & Band Edge	35
Supplemental Information	58
Emissions Test Details	58

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Davis Instruments
3465 Diablo Avenue
Hayward, CA 94545

REPORT PREPARED BY:

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

REPRESENTATIVE: Perry Dillon
Customer Reference Number: 85378

Project Number: 97253

DATE OF EQUIPMENT RECEIPT:

November 10, 2015

DATE(S) OF TESTING:

November 10-17, 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.

A handwritten signature in black ink, reading "Steve Behm", is positioned above a horizontal line.

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

Test Procedure	Description	Modifications	Results
15.247(a) Fundamental Characteristics			
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	V	Pass
15.247(a)(1)(i)	Average Time of Occupancy	NA	Pass
15.247 (a)	Dwell Time Correction Factor	NA	Pass
15.247(b) Output Power			
15.247(b)(2)	Peak Conducted Output Power	NA	Pass
15.247(d) Spurious Emissions			
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 Node	Davis Instruments	6810	6810-1

Support Equipment:

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

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
EnviroMonitor Node	Davis Instruments	6810	6810-2

Support Equipment:

Device	Manufacturer	Model #	S/N
Temperature Probe	Davis Instruments	Product # 6470	NA
Temperature Probe	Davis Instruments	Product # 6470	NA
Temperature Probe	Davis Instruments	Product # 6470	NA
Temperature Probe	Davis Instruments	Product # 6470	NA
Laptop Computer	Fujitsu	C1410 Dual-Core TS600	R6Z16003

FCC PART 15 SUBPART C

15.247(a) Fundamental Characteristics

15.247(a)(1) Carrier Separation

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Davis Instruments**
 Specification: **15.247(a)(1)**
 Work Order #: **97253** Date: 11/10/2015
 Test Type: **Conducted Power Measurement**
 Tested By: Hieu Song Nguyenpham
 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

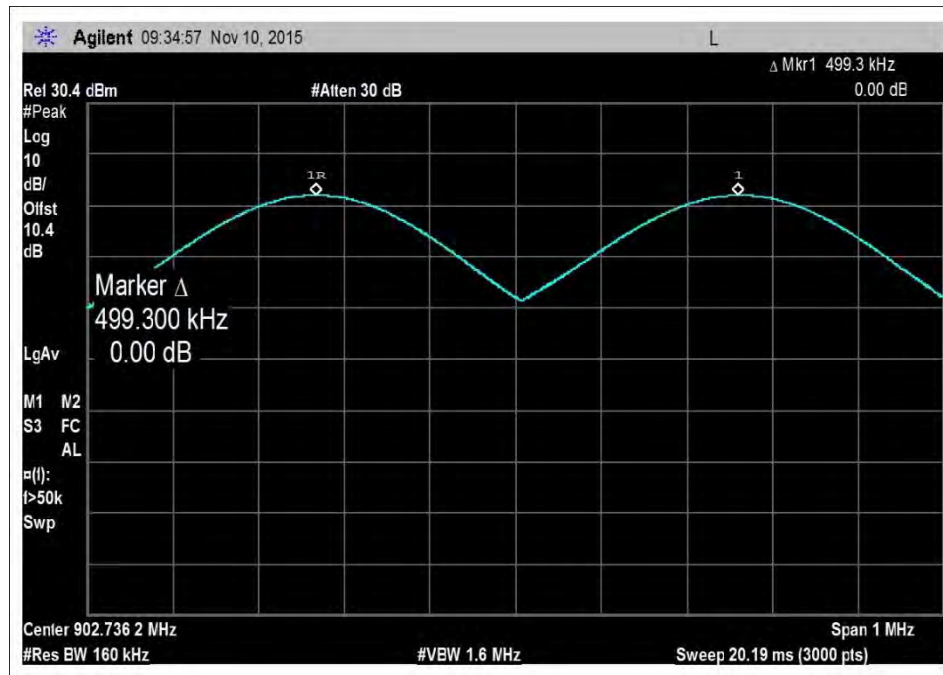
Temperature: 21.7°C
 Relative Humidity: 45 %
 Atmospheric Pressure: 101.9 kPa

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

ISM Band on TX Mode

Plots

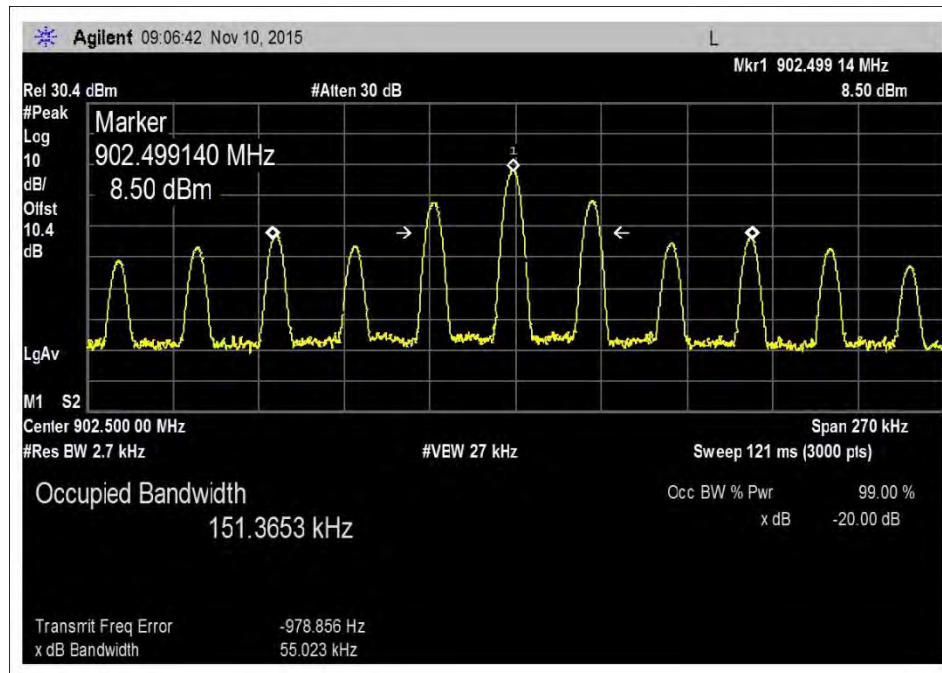
Frequency Separation



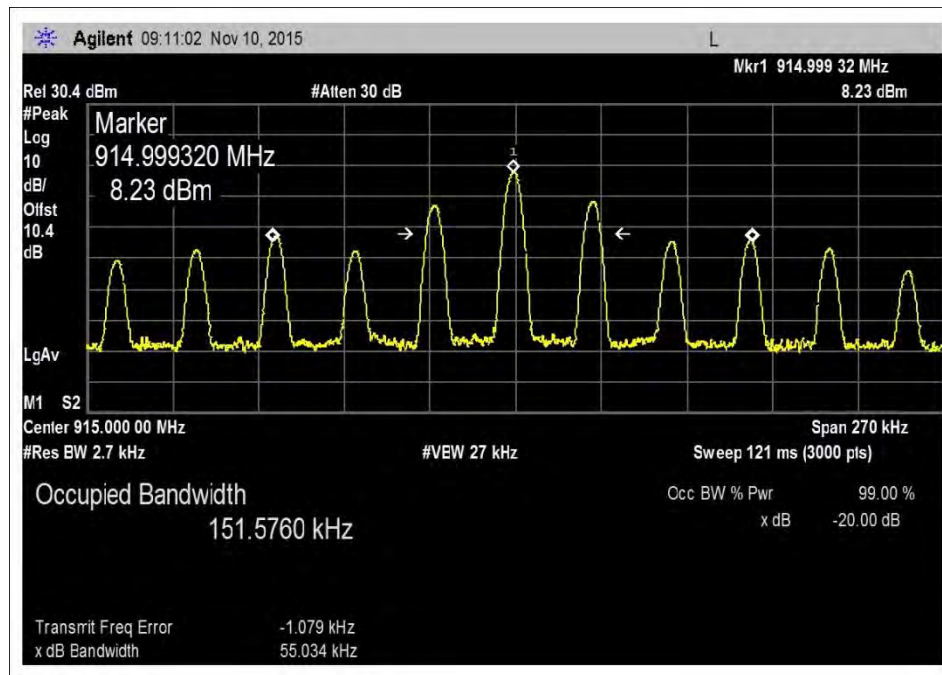
15.247(a)(1)(i) 20 dB Bandwidth

Plots

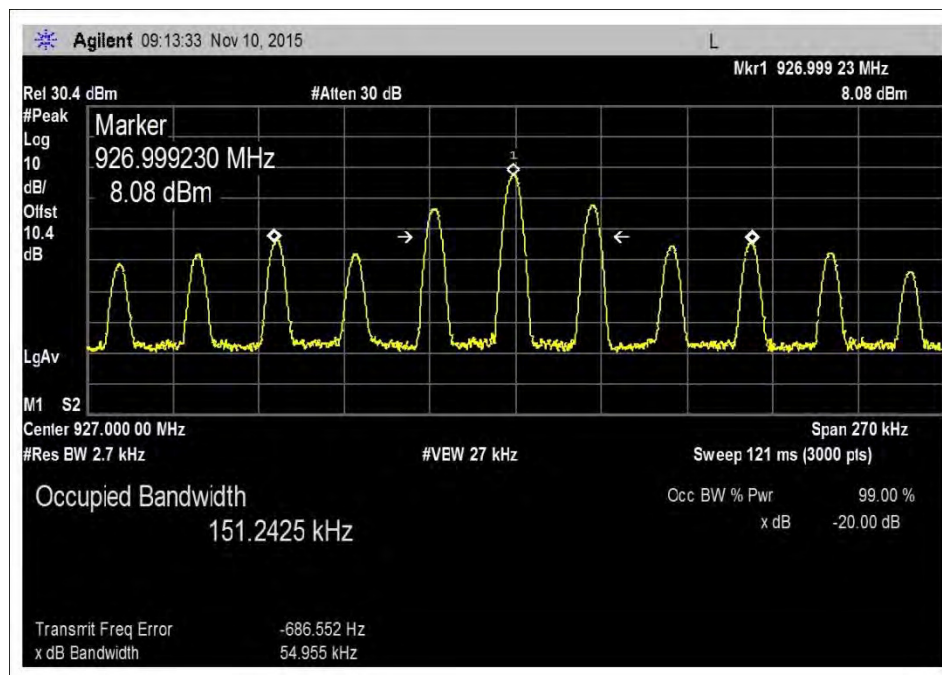
20dB Bandwidth



Low Channel



Middle Channel

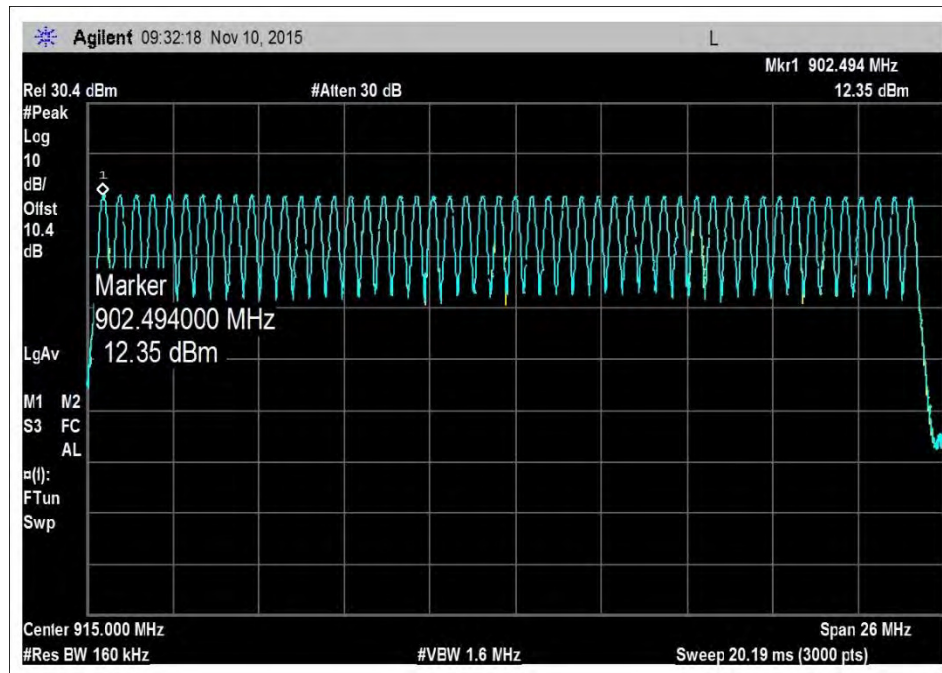


High Channel

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

Plots

Number of Hopping Channels



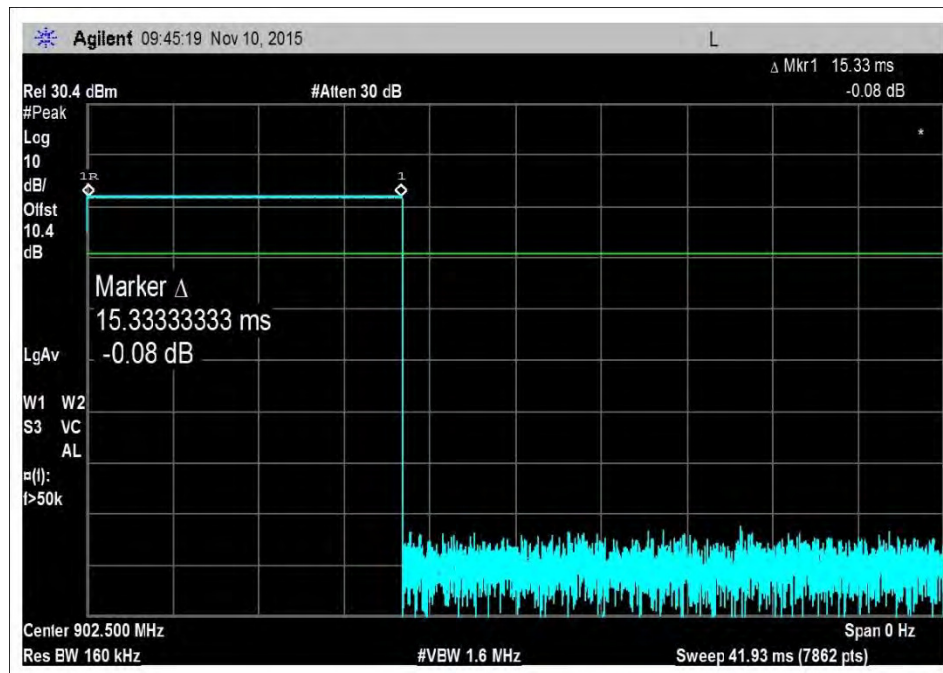
50 channels

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

Plots

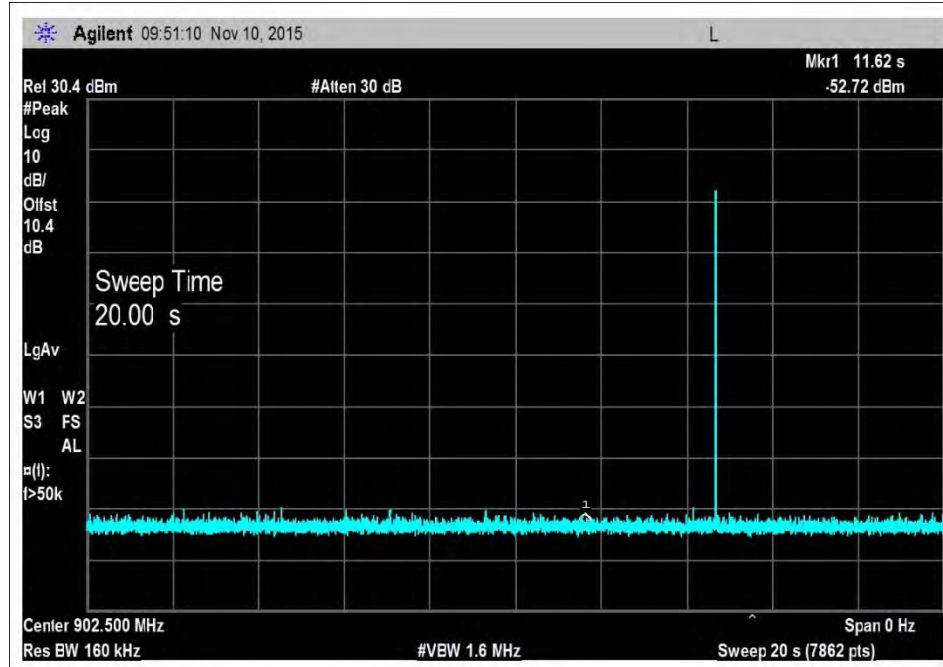
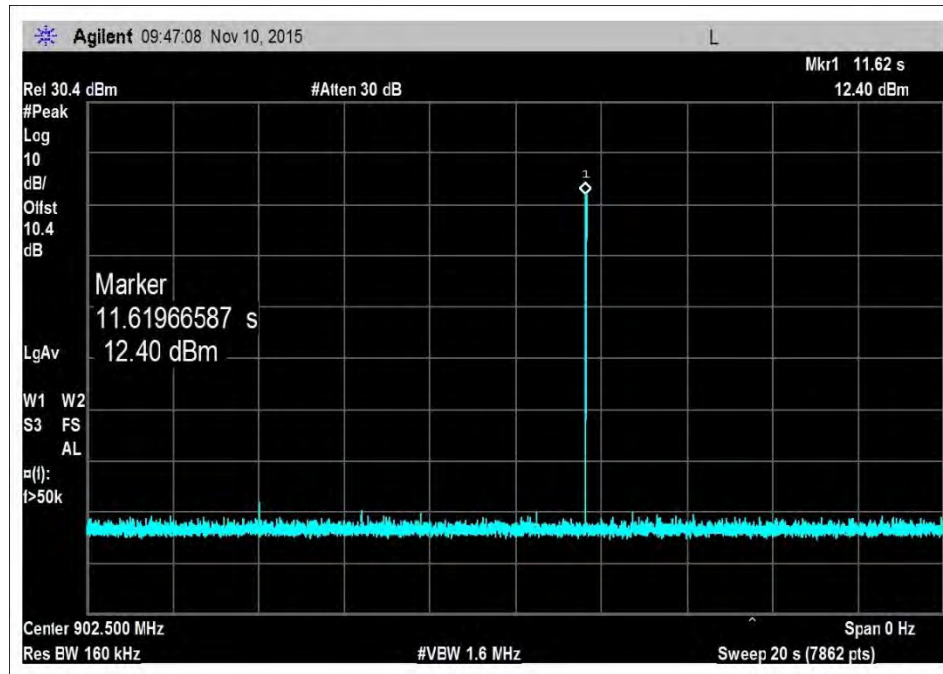
Average time of occupancy

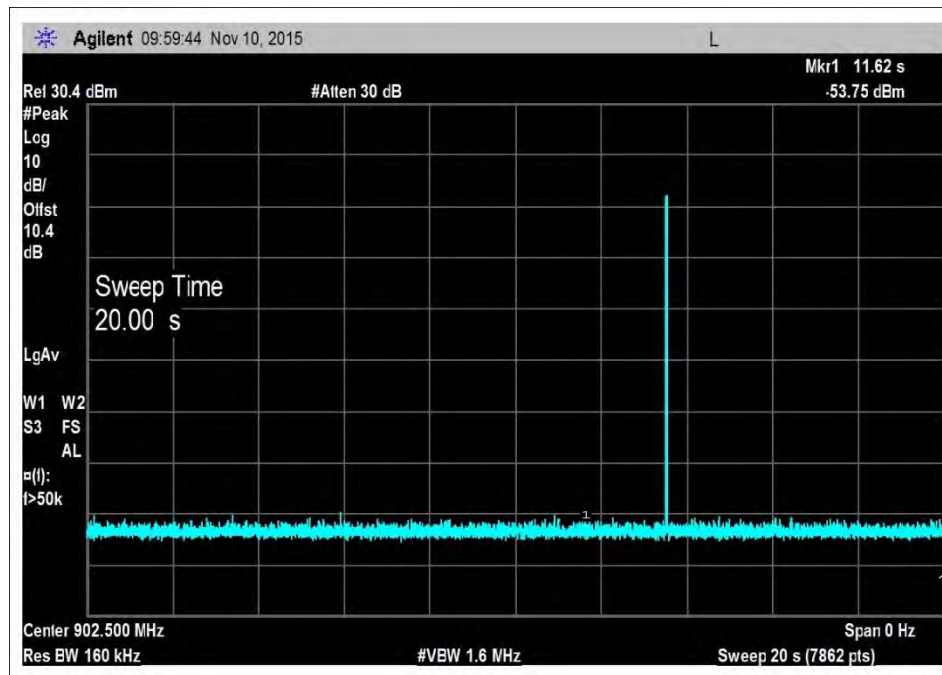
Dwell Time



Dwell time =15.2861333ms

Channel Occupancy in 20s





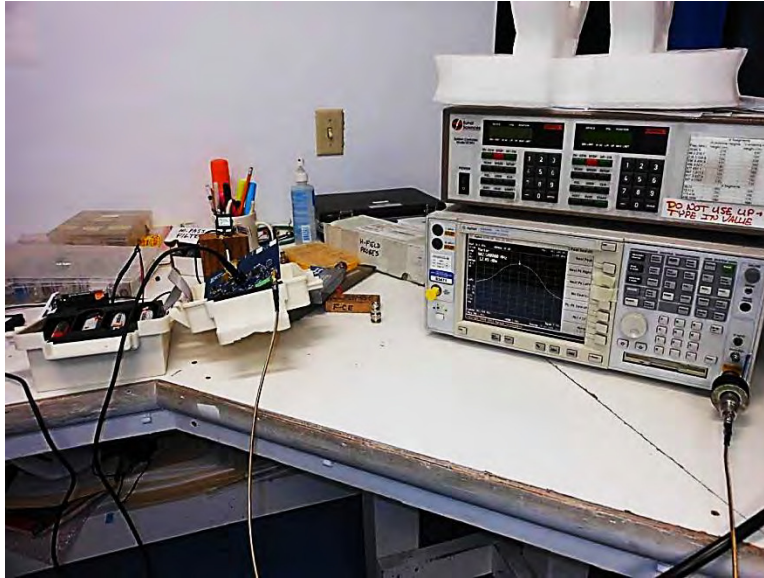
There is 1 events which usually occurs in 20s

Limit: On time **shall not exceed 0.4 second** in 20s

Each events on time = 15.33ms

Therefore, total on time = $15.33\text{msec} \times 1 \text{ events /sec} = 15.33\text{ms} = 0.001533\text{s}$

Test Setup Photo



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 Instruments**
 Specification: **15.247(b)(2)- Power Output (902-928 MHz FHSS)**
 Work Order #: **97253** Date: 11/10/2015
 Test Type: **Conducted Power Measurement**
 Tested By: Hieu Song Nguyenpham
 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:

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: 21.7°C
 Relative Humidity: 45 %
 Atmospheric Pressure: 101.9 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 continuously transmitting or receiving as intended.
ISM Band on TX Mode

Test Data - Voltage Variations

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Davis Instruments**
 Specification: **15.31e**
 Work Order #: **97253** Date: 11/10/2015
 Test Type: **Conducted Power Measurement**
 Tested By: Hieu Song Nguyenpham
 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: 21.7°C

Relative Humidity: 45 %

Atmospheric Pressure: 101.9 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

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

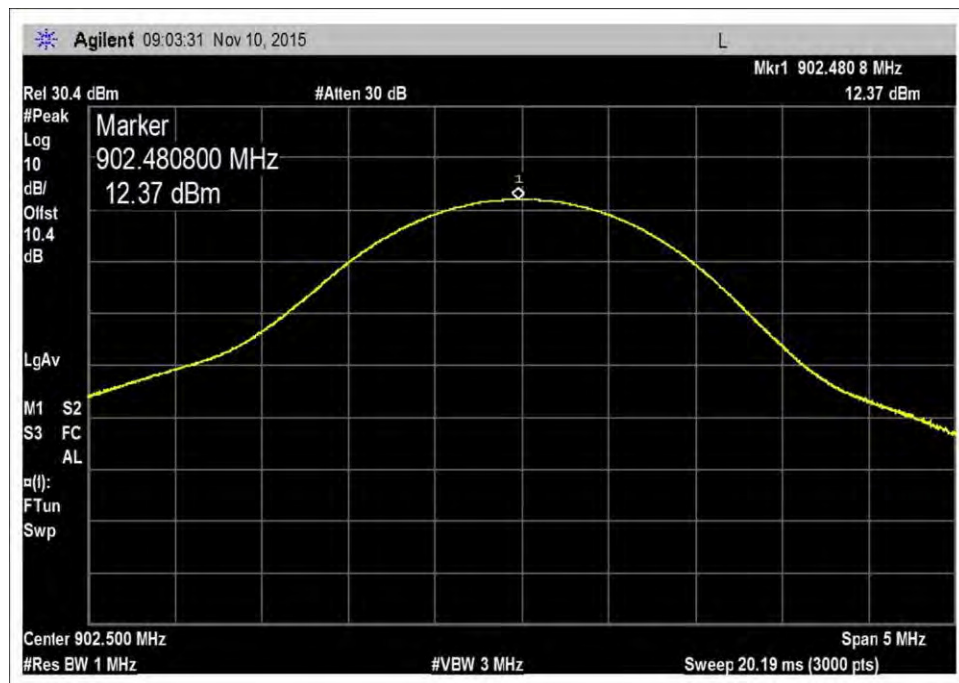
ISM Band on TX Mode

15.31e: New batteries were used

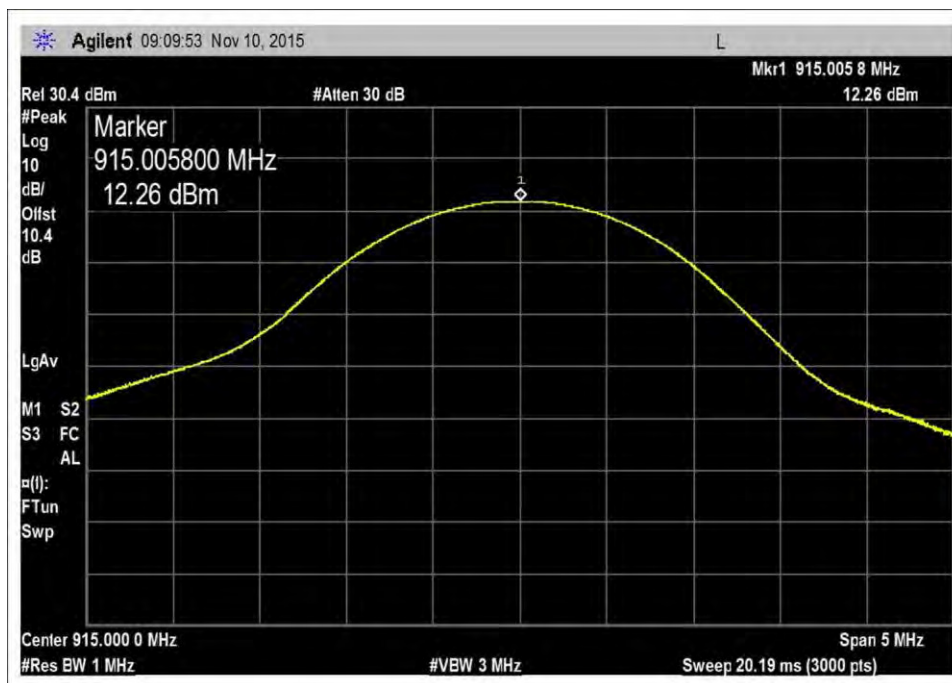
Test Data Summary - RF Conducted Measurement

Frequency (MHz)	Measured Power in Watt	Power Limit in Watt	Pass/Fail
Low Channel 902.5	0.017258379	1.00	Pass
Middle Channel 915	0.016826741	1.00	Pass
High Channel 927	0.015417005	1.00	Pass

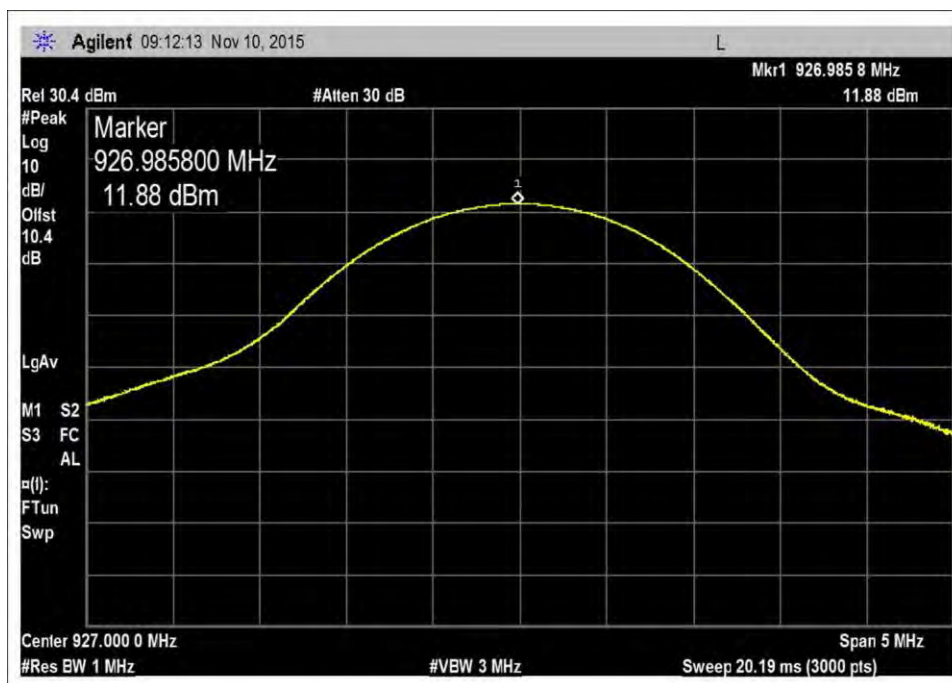
Plots



Low Channel

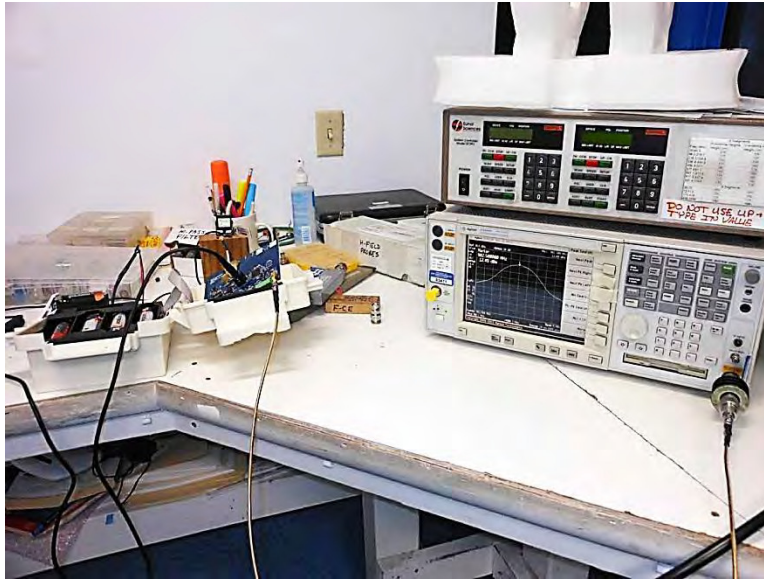


Middle Channel



High Channel

Test Setup Photo



15.247(d) Spurious Emissions & Band Edge

15.247(d) RF Conducted Emissions & Band Edge

Test Conditions

NOTE: The Reference Level is the limit line for Conducted Spurious Emission for Non-Restricted Frequency Band

Reference Limit in 100kHz			
Channel	dBm in 100kHz	dBuV in 100kHz	Reference Limit dBuV
Low	12.37	119.37	99.37
Middle	12.19	119.19	99.19
High	11.82	118.82	98.82

Choose the worst case for the limit 98.82

Test Conditions / Setup / 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 #: **97253** Date: 11/10/2015
 Test Type: **Conducted Spurious Emission** Time: 10:53:40 AM
 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

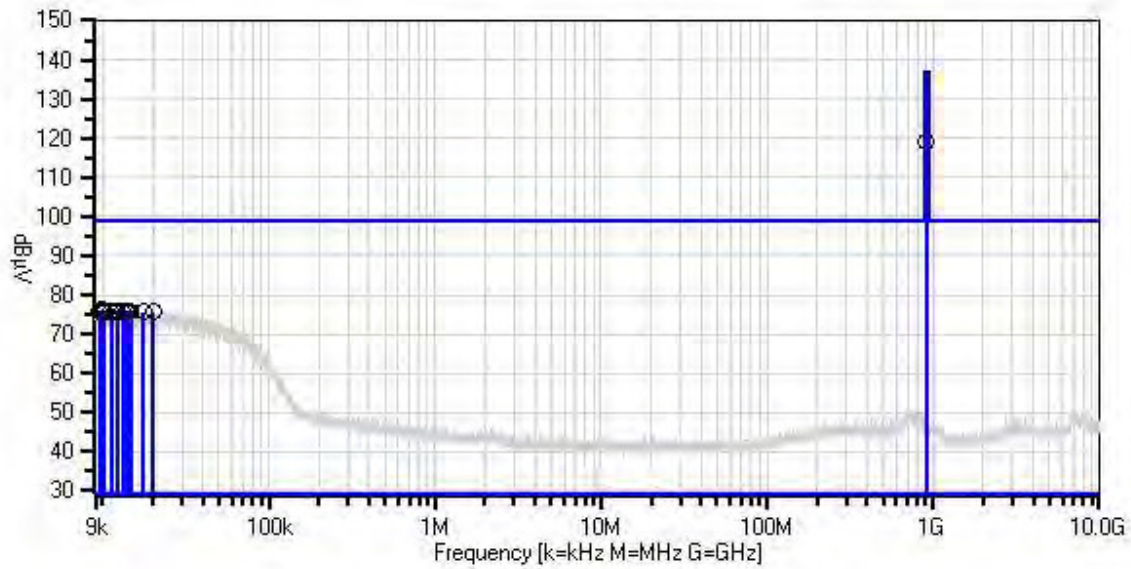
 Temperature: 21.7°C
 Relative Humidity: 45 %
 Atmospheric Pressure: 101.9 kPa

 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 continuously transmitting as intended.
ISM Band on TX Mode
Low Channel

Davis Instruments W/O#: 97253 Sequence#: 5 Date: 11/10/2015
15.247(d) Conducted Spurious Emissions Test Distance: None



Test Equipment:

ID	Asset #/Serial #	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 dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	902.365M	108.9	+10.0	+0.4			+0.0	119.3	137.0	-17.7	None
2	9.818k	66.4	+9.9	+0.0			+0.0	76.3	98.8	-22.5	None
3	9.965k	66.2	+9.9	+0.0			+0.0	76.1	98.8	-22.7	None
4	10.072k	66.2	+9.9	+0.0			+0.0	76.1	98.8	-22.7	None
5	11.320k	66.1	+9.9	+0.0			+0.0	76.0	98.8	-22.8	None
6	13.767k	66.1	+9.9	+0.0			+0.0	76.0	98.8	-22.8	None
7	14.747k	66.1	+9.9	+0.0			+0.0	76.0	98.8	-22.8	None
8	9.523k	66.1	+9.9	+0.0			+0.0	76.0	98.8	-22.8	None
9	10.233k	66.0	+9.9	+0.0			+0.0	75.9	98.8	-22.9	None
10	9.918k	66.0	+9.9	+0.0			+0.0	75.9	98.8	-22.9	None
11	12.131k	66.0	+9.9	+0.0			+0.0	75.9	98.8	-22.9	None
12	14.405k	66.0	+9.9	+0.0			+0.0	75.9	98.8	-22.9	None
13	13.298k	66.0	+9.9	+0.0			+0.0	75.9	98.8	-22.9	None
14	17.613k	65.9	+9.9	+0.0			+0.0	75.8	98.8	-23.0	None
15	20.130k	65.9	+9.9	+0.0			+0.0	75.8	98.8	-23.0	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 #: **97253** Date: 11/10/2015
 Test Type: **Conducted Spurious Emission** Time: 10:41:15 AM
 Tested By: Hieu Song Nguyenpham Sequence#: 4
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

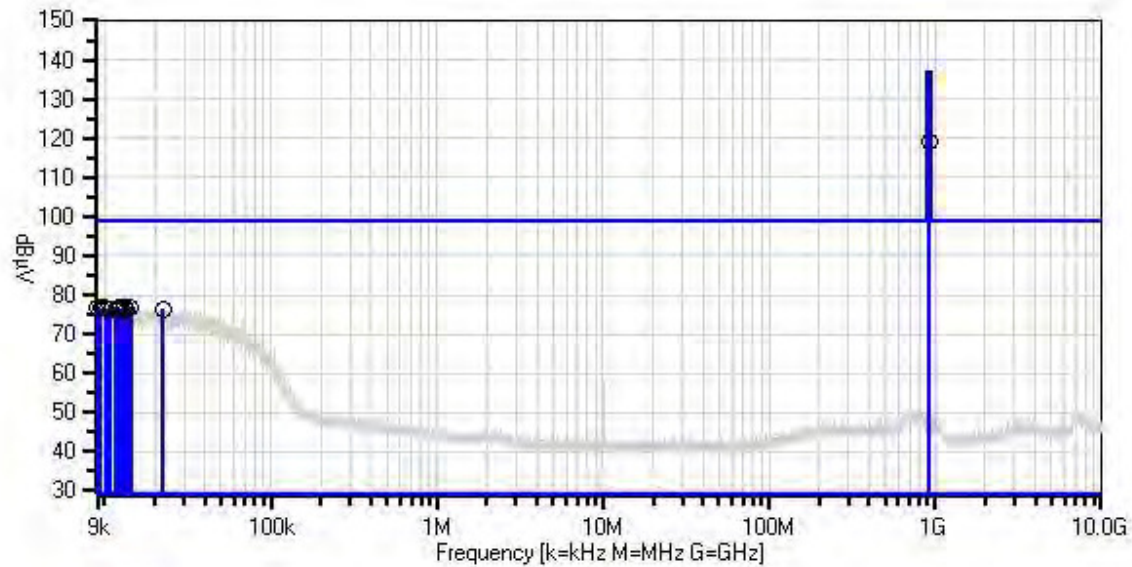
Support Equipment:

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: 21.7°C Relative Humidity: 45 % Atmospheric Pressure: 101.9 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 continuously transmitting as intended. ISM Band on TX Mode Middle Channel
--

Davis Instruments W/O#: 97253 Sequence#: 4 Date: 11/10/2015
 15.247(d) Conducted Spurious Emissions Test Distance: None



Sweep Data
 ○ Peak Readings
 * Average Readings
 Software Version: 5.02.00

— Readings
 — QP Readings
 ▼ Ambient
 — 1 - 15.247(d) Conducted Spurious Emissions

Test Equipment:

ID	Asset #/Serial #	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 dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	914.994M	108.8	+9.9	+0.4			+0.0	119.1	137.0	-17.9	None
2	9.013k	66.8	+9.9	+0.0			+0.0	76.7	98.8	-22.1	None
3	12.312k	66.8	+9.9	+0.0			+0.0	76.7	98.8	-22.1	None
4	12.158k	66.7	+9.9	+0.0			+0.0	76.6	98.8	-22.2	None
5	10.052k	66.7	+9.9	+0.0			+0.0	76.6	98.8	-22.2	None
6	14.438k	66.7	+9.9	+0.0			+0.0	76.6	98.8	-22.2	None
7	13.030k	66.7	+9.9	+0.0			+0.0	76.6	98.8	-22.2	None
8	9.456k	66.7	+9.9	+0.0			+0.0	76.6	98.8	-22.2	None
9	13.640k	66.6	+9.9	+0.0			+0.0	76.5	98.8	-22.3	None
10	22.412k	66.6	+9.9	+0.0			+0.0	76.5	98.8	-22.3	None
11	10.213k	66.5	+9.9	+0.0			+0.0	76.4	98.8	-22.4	None
12	12.010k	66.5	+9.9	+0.0			+0.0	76.4	98.8	-22.4	None
13	12.674k	66.5	+9.9	+0.0			+0.0	76.4	98.8	-22.4	None
14	10.824k	66.4	+9.9	+0.0			+0.0	76.3	98.8	-22.5	None
15	11.776k	66.4	+9.9	+0.0			+0.0	76.3	98.8	-22.5	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 #: **97253** Date: 11/10/2015
 Test Type: **Conducted Spurious Emission** Time: 10:26:25 AM
 Tested By: Hieu Song Nguyenpham Sequence#: 3
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

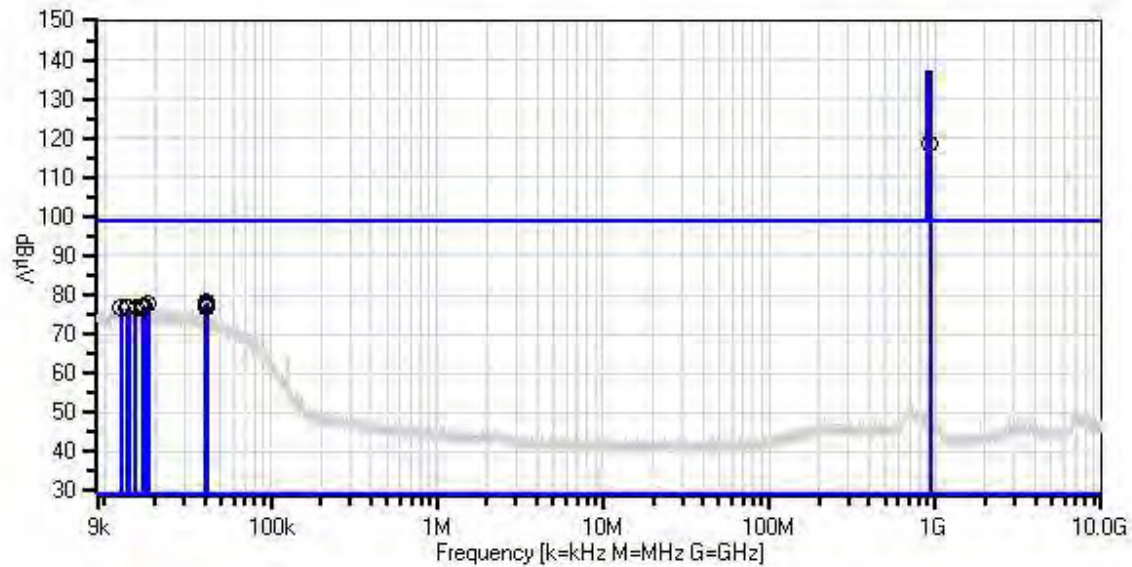
Support Equipment:

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: 21.7°C Relative Humidity: 45 % Atmospheric Pressure: 101.9 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 continuously transmitting as intended. ISM Band on TX Mode High Channel
--

Davis Instruments W/O#: 97253 Sequence#: 3 Date: 11/10/2015
15.247(d) Conducted Spurious Emissions Test Distance: None



○ Sweep Data
○ Peak Readings
* Average Readings
Software Version: 5.02.00

— Readings
— QP Readings
▼ Ambient
— 1 - 15.247(d) Conducted Spurious Emissions

Test Equipment:

ID	Asset #/Serial #	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 μ V	T1 dB	T2 dB			Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	926.992M	108.5	+9.9	+0.3			+0.0	118.7	137.0	-18.3	None
2	40.930k	68.3	+9.9	+0.0			+0.0	78.2	98.8	-20.6	None
3	18.245k	67.8	+9.9	+0.0			+0.0	77.7	98.8	-21.1	None
4	40.624k	67.8	+9.9	+0.0			+0.0	77.7	98.8	-21.1	None
5	41.053k	67.5	+9.9	+0.0			+0.0	77.4	98.8	-21.4	None
6	17.309k	67.2	+9.9	+0.0			+0.0	77.1	98.8	-21.7	None
7	15.417k	67.1	+9.9	+0.0			+0.0	77.0	98.8	-21.8	None
8	41.196k	67.0	+9.9	+0.0			+0.0	76.9	98.8	-21.9	None
9	13.922k	67.0	+9.9	+0.0			+0.0	76.9	98.8	-21.9	None
10	13.653k	66.9	+9.9	+0.0			+0.0	76.8	98.8	-22.0	None
11	13.794k	66.9	+9.9	+0.0			+0.0	76.8	98.8	-22.0	None
12	13.969k	66.9	+9.9	+0.0			+0.0	76.8	98.8	-22.0	None
13	12.574k	66.8	+9.9	+0.0			+0.0	76.7	98.8	-22.1	None
14	16.981k	66.8	+9.9	+0.0			+0.0	76.7	98.8	-22.1	None
15	17.403k	66.7	+9.9	+0.0			+0.0	76.6	98.8	-22.2	None

Band Edge

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Davis Instruments**
 Specification: **Band Edge Set up**
 Work Order #: **97253** Date: 11/10/2015
 Test Type: **Conducted Power Measurement**
 Tested By: Hieu Song Nguyenpham
 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

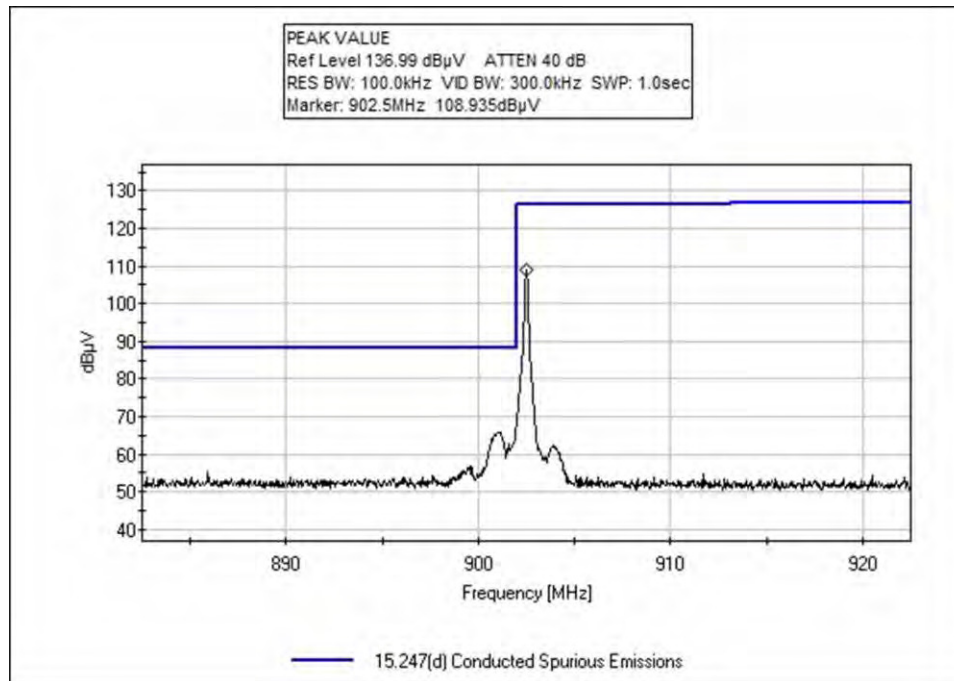
Temperature: 21.7°C
 Relative Humidity: 45 %
 Atmospheric Pressure: 101.9 kPa

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

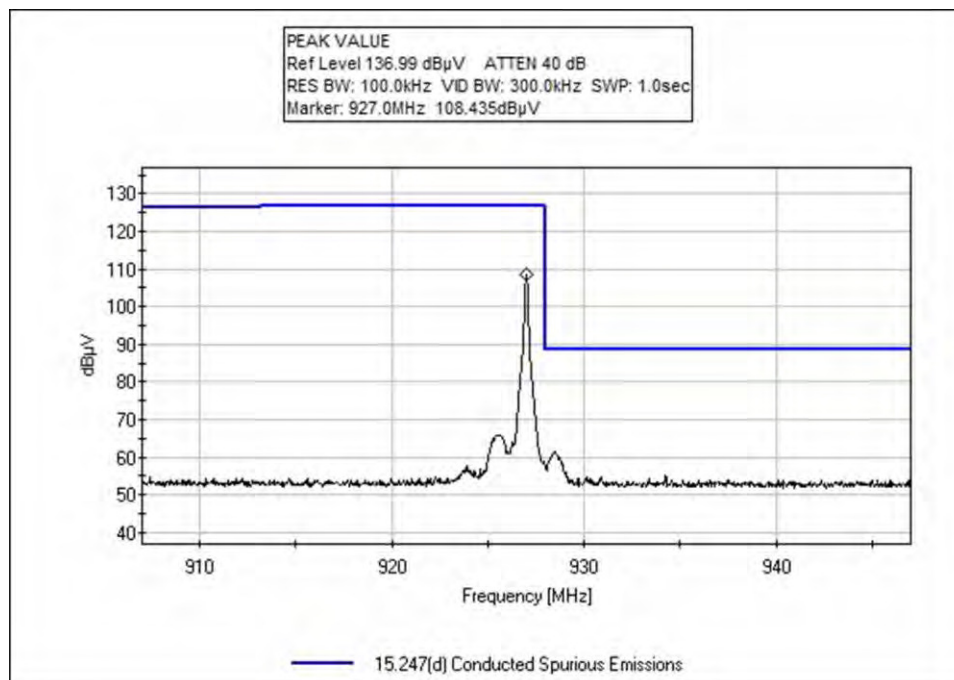
The EUT is placed on the table and set continuously transmitting or receiving as intended.

ISM Band on TX Mode

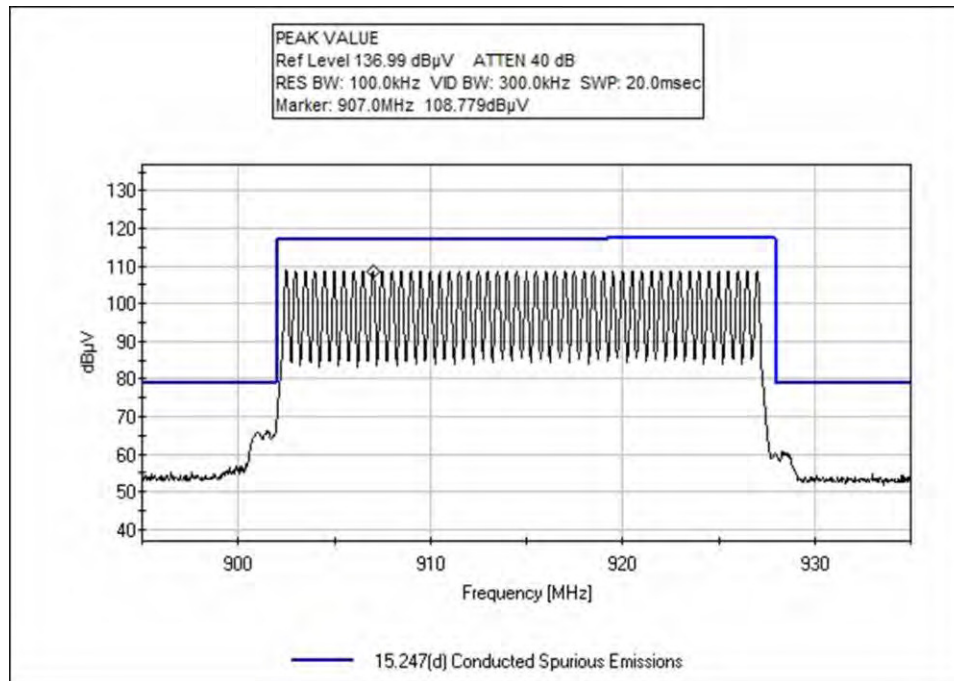
Band Edge Plots



Low Channel

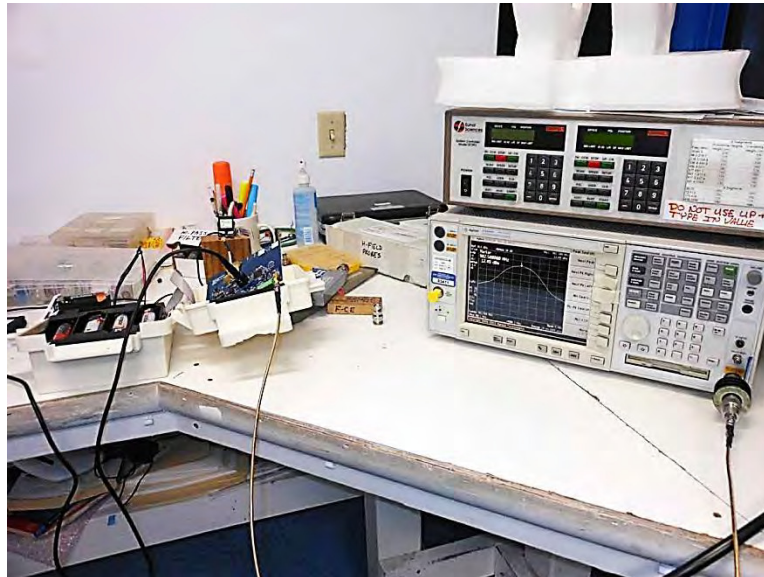


High Channel



Hopping

Test Setup Photo



15.247(d) Radiated Emissions & Band Edge

Test Conditions / Setup / 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 #: **97253** Date: 11/17/2015
 Test Type: **Radiated Scan** Time: 15:25:02
 Tested By: Hieu Song Nguyenpham Sequence#: 90
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Radiated 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: 19.9°C
 Relative Humidity: 46 %
 Atmospheric Pressure: 102.8 kPa

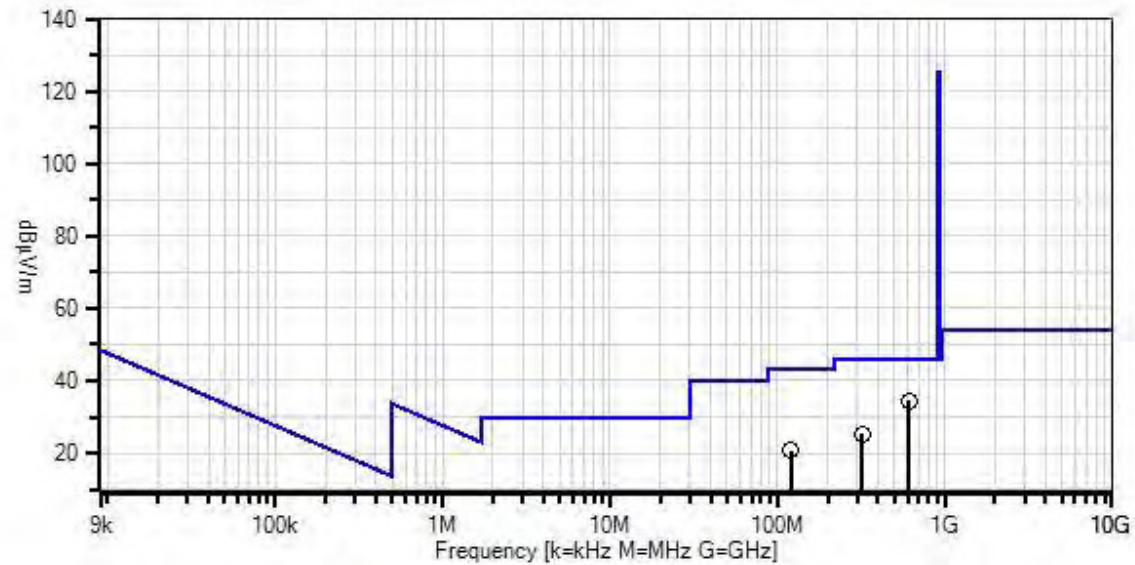
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Transmitting operating frequency= 902.5, 915 and 927MHz for ISM
 Gain of the antenna for Bluetooth= 1dBi
 Gain of the antenna for ISM= 2dBi
 Method: ANSI C 63.4 2009 section 8.3

 The EUT is placed on the table and set as set continuously transmitting or receiving as intended.
 The EUT is connected to four temperature probes to maximize a full load.

 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 - 10000MHz- RBW =1MHz VBW=1MHz

ISM on TX Mode, Low Channel

Davis Instruments WO#: 97253 Sequence#: 90 Date: 11/17/2015
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 #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00567	Preamp	8447D	1/2/2015	1/2/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T3	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T4	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T5	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	613.666M	38.5	-28.0 +1.1	+19.7	+2.5	+0.6	+0.0	34.4	46.0	-11.6	Vert
2	322.014M	36.4	-28.0 +0.7	+14.1	+1.7	+0.4	+0.0	25.3	46.0	-20.7	Vert
3	120.693M	35.1	-27.8 +0.4	+11.8	+1.0	+0.2	+0.0	20.7	43.5	-22.8	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 #: **97253** Date: 11/13/2015
 Test Type: **Radiated Scan** Time: 09:03:03
 Tested By: Hieu Song Nguyenpham Sequence#: 16
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

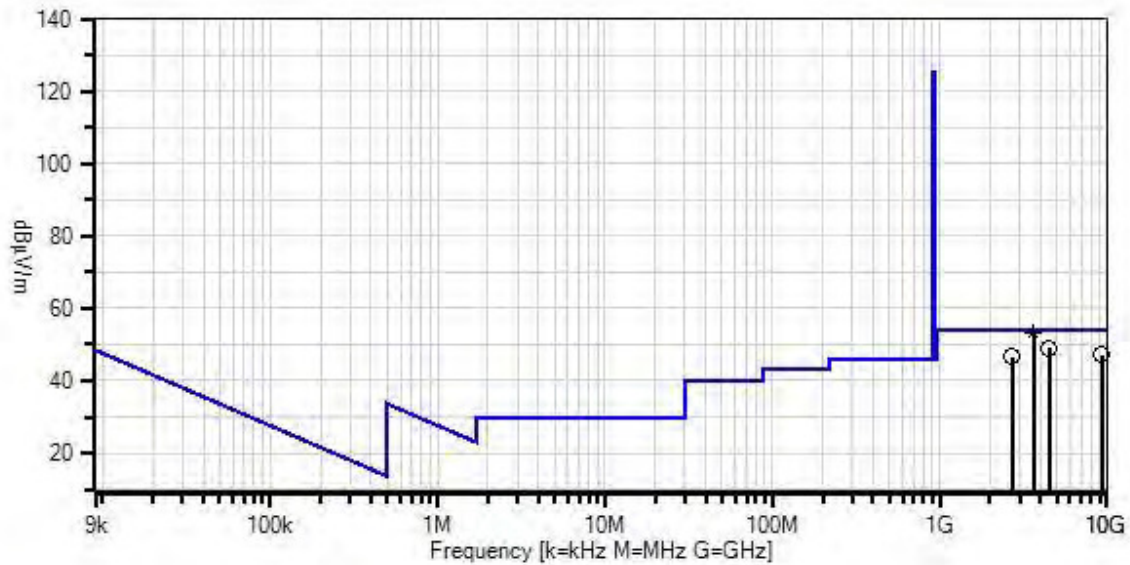
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

<p> Radiated 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: 19.9°C Relative Humidity: 46 % Atmospheric Pressure: 102.8 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 section 8.3 The EUT is placed on the table and set as set continuously transmitting or receiving as intended. The EUT is connected to four temperature probes to maximize a full load. Frequency range of measurement = 9 kHz - 10GHz. 9 kHz - 150 kHz - RBW=200Hz VBW= 200Hz 150 kHz - 30MHz - RBW=9kHz VBW= 9kHz 30 MHz - 1000MHz - RBW=120 kHz VBW=120kHz 1000MHz - 10000MHz- RBW =1MHz VBW=1MHz ISM Band on TX Mode Low Channel </p>

Davis Instruments WO#: 97253 Sequence#: 16 Date: 11/13/2015
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 #/Serial #	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 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	3610.047M	74.8	-58.7 +0.9	+31.4 +0.1	+1.4	+3.2	+0.0	53.1	54.0	-0.9	Vert
^	3610.047M	82.0	-58.7 +0.9	+31.4 +0.1	+1.4	+3.2	+0.0	60.3	54.0	+6.3	Vert
3	4512.509M	68.6	-58.3 +1.0	+32.4 +0.2	+1.6	+3.6	+0.0	49.1	54.0	-4.9	Horiz
4	9308.576M	56.5	-56.8 +1.6	+38.3 +0.1	+2.3	+5.2	+0.0	47.2	54.0	-6.8	Horiz
5	2707.706M	70.9	-58.5 +0.8	+29.2 +0.2	+1.2	+2.7	+0.0	46.5	54.0	-7.5	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 #: **97253** Date: 11/17/2015
 Test Type: **Radiated Scan** Time: 15:52:11
 Tested By: Hieu Song Nguyenpham Sequence#: 93
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

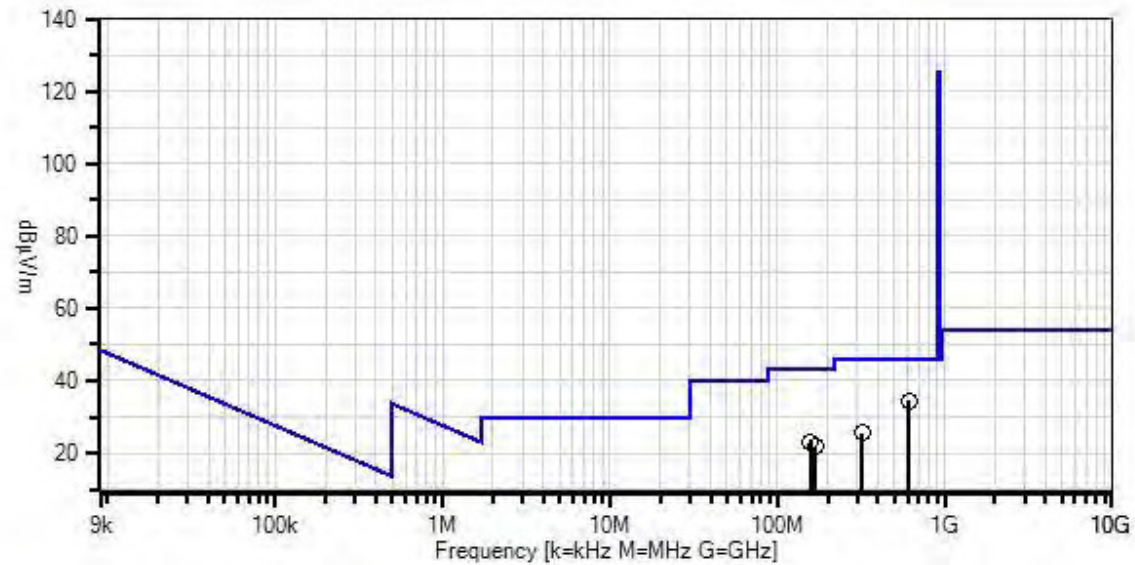
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

<p> Radiated 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: 19.9°C Relative Humidity: 46 % Atmospheric Pressure: 102.8 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 section 8.3 The EUT is placed on the table and set as set continuously transmitting or receiving as intended. The EUT is connected to four temperature probes to maximize a full load. Frequency range of measurement = 9 kHz - 10GHz. 9 kHz - 150 kHz - RBW=200Hz VBW= 200Hz 150 kHz - 30 MHz - RBW=9kHz VBW= 9kHz 30 MHz - 1000MHz - RBW=120 kHz VBW=120 kHz 1000MHz - 10000MHz- RBW =1MHz VBW=1MHz ISM on TX Mode Middle Channel </p>

Davis Instruments WO#: 97253 Sequence#: 93 Date: 11/17/2015
 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 #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00567	Preamp	8447D	1/2/2015	1/2/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T3	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T4	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T5	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	609.341M	38.6	-28.0 +1.1	+19.7	+2.5	+0.6	+0.0	34.5	46.0	-11.5	Vert
2	322.014M	36.8	-28.0 +0.7	+14.1	+1.7	+0.4	+0.0	25.7	46.0	-20.3	Vert
3	156.849M	38.2	-27.8 +0.5	+10.9	+1.1	+0.2	+0.0	23.1	43.5	-20.4	Vert
4	168.981M	37.8	-27.9 +0.5	+9.9	+1.2	+0.2	+0.0	21.7	43.5	-21.8	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 #: **97253** Date: 11/13/2015
 Test Type: **Radiated Scan** Time: 09:59:36
 Tested By: Hieu Song Nguyenpham Sequence#: 19
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

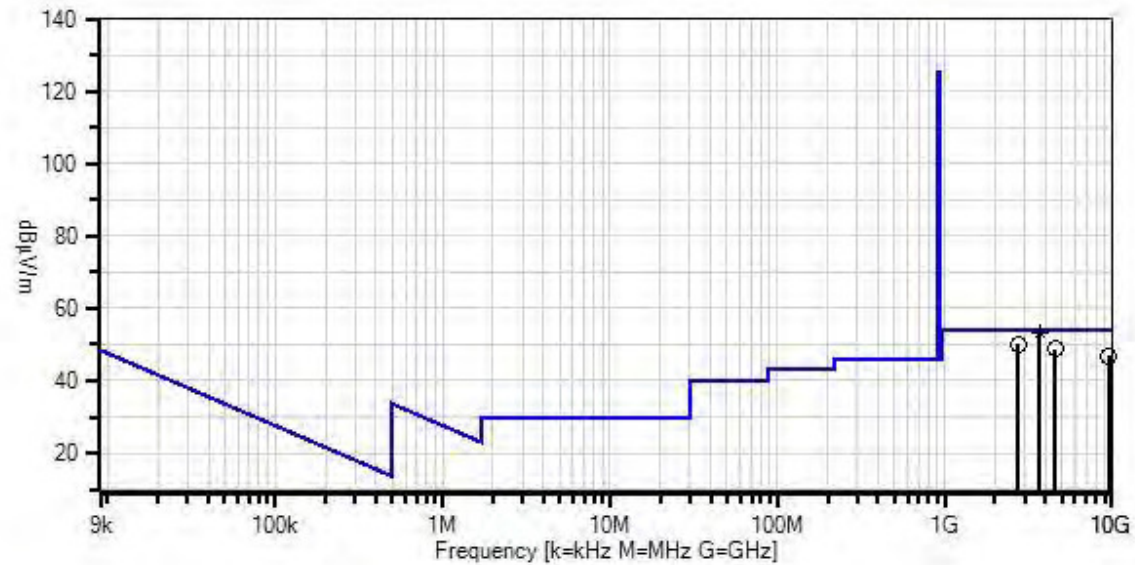
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

<p> Radiated 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: 19.9°C Relative Humidity: 46 % Atmospheric Pressure: 102.8 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 section 8.3 The EUT is placed on the table and set as set continuously transmitting or receiving as intended. The EUT is connected to four temperature probes to maximize a full load. Frequency range of measurement = 9 kHz - 10GHz. 9 kHz - 150 kHz - RBW=200 Hz VBW =200Hz 150 kHz - 30 MHz - RBW=9 kHz VBW =9kHz 30 MHz - 1000MHz - RBW=120 kHz VBW=120kHz 1000MHz - 10000MHz- RBW =1MHz VBW=1MHz ISM Band on TX Mode Middle Channel </p>

Davis Instruments WO#: 97253 Sequence#: 19 Date: 11/13/2015
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 #/Serial #	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 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	3660.034M	74.8	-58.8 +0.9	+31.7 +0.1	+1.4	+3.2	+0.0	53.3	54.0	-0.7	Horiz
^	3660.034M	81.8	-58.8 +0.9	+31.7 +0.1	+1.4	+3.2	+0.0	60.3	54.0	+6.3	Horiz
3	2744.743M	74.7	-58.5 +0.8	+29.1 +0.2	+1.2	+2.7	+0.0	50.2	54.0	-3.8	Horiz
4	4574.571M	68.0	-58.2 +1.0	+32.5 +0.2	+1.6	+3.7	+0.0	48.8	54.0	-5.2	Horiz
5	9482.176M	56.1	-57.2 +1.6	+38.5 +0.1	+2.4	+5.3	+0.0	46.8	54.0	-7.2	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 #: **97253** Date: 11/17/2015
 Test Type: **Radiated Scan** Time: 16:23:17
 Tested By: Hieu Song Nguyenpham Sequence#: 96
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

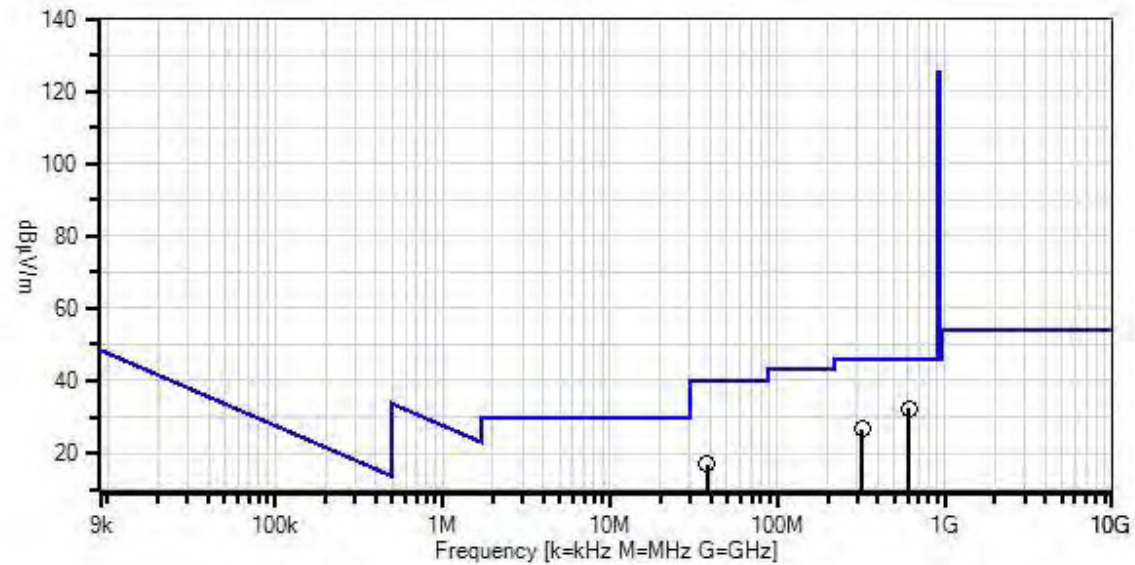
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

<p>Radiated 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</p> <p>Temperature: 19.9°C Relative Humidity: 46 % Atmospheric Pressure: 102.8 kPa</p> <p>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 section 8.3</p> <p>The EUT is placed on the table and set as set continuously transmitting or receiving as intended. The EUT is connected to four temperature probes to maximize a full load.</p> <p>Frequency range of measurement = 9 kHz - 10GHz. 9 kHz - 150 kHz - RBW=200 Hz VBW =200Hz 150 kHz - 30 MHz - RBW=9 kHz VBW =9kHz 30 MHz - 1000MHz -RBW=120 kHz VBW=120kHz 1000MHz - 10000MHz- RBW =1MHz VBW=1MHz</p> <p>ISM on TX Mode High Channel</p>
--

Davis Instruments WO#: 97253 Sequence#: 96 Date: 11/17/2015
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 #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN00567	Preamp	8447D	1/2/2015	1/2/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
T3	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T4	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
T5	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	611.383M	36.5	-28.0 +1.1	+19.7	+2.5	+0.6	+0.0	32.4	46.0	-13.6	Vert
2	322.375M	37.8	-28.0 +0.7	+14.1	+1.7	+0.4	+0.0	26.7	46.0	-19.3	Vert
3	37.986M	29.2	-27.9 +0.2	+14.8	+0.5	+0.1	+0.0	16.9	40.0	-23.1	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 #: **97253** Date: 11/13/2015
 Test Type: **Radiated Scan** Time: 10:58:28
 Tested By: Hieu Song Nguyenpham Sequence#: 22
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

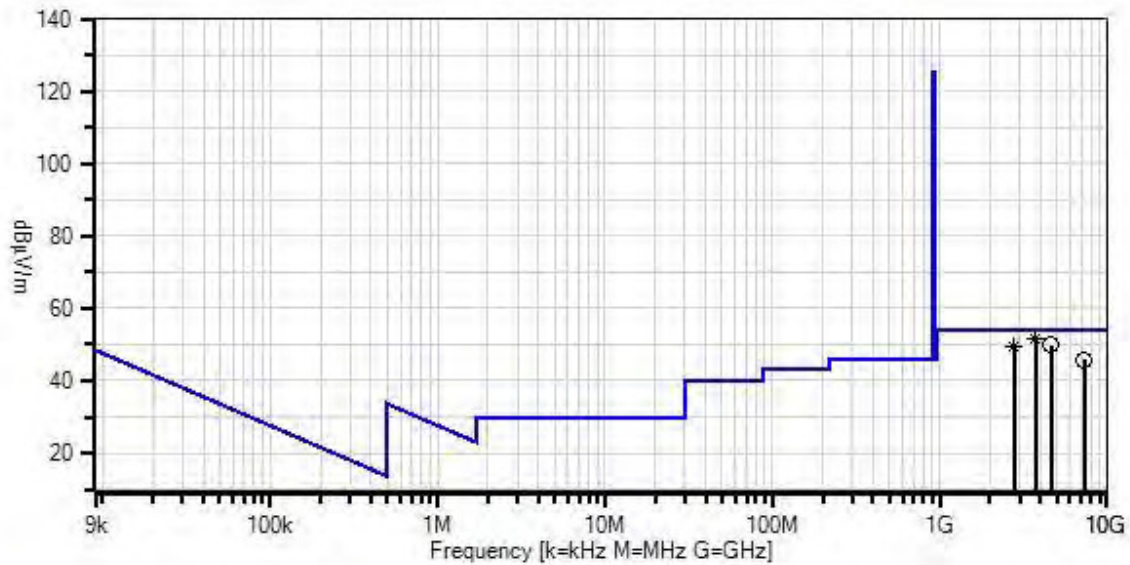
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

<p>Radiated 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</p> <p>Temperature: 19.9°C Relative Humidity: 46 % Atmospheric Pressure: 102.8 kPa</p> <p>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 section 8.3</p> <p>The EUT is placed on the table and set as set continuously transmitting or receiving as intended. The EUT is connected to four temperature probes to maximize a full load.</p> <p>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</p> <p>ISM Band on TX Mode High Channel</p>

Davis Instruments WO#: 97253 Sequence#: 22 Date: 11/13/2015
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 #/Serial #	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 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	3708.042M	72.6	-58.8 +0.9	+32.0 +0.1	+1.5	+3.2	+0.0	51.5	54.0	-2.5	Horiz
^	3708.042M	79.1	-58.8 +0.9	+32.0 +0.1	+1.5	+3.2	+0.0	58.0	54.0	+4.0	Horiz
3	4635.632M	68.6	-58.0 +1.1	+32.7 +0.2	+1.6	+3.7	+0.0	49.9	54.0	-4.1	Horiz
4	2781.030M	73.5	-58.5 +0.8	+29.1 +0.2	+1.3	+2.8	+0.0	49.2	54.0	-4.8	Horiz
^	2781.030M	80.1	-58.5 +0.8	+29.1 +0.2	+1.3	+2.8	+0.0	55.8	54.0	+1.8	Horiz
6	7291.285M	59.2	-58.3 +1.3	+36.3 +0.2	+2.1	+5.0	+0.0	45.8	54.0	-8.2	Horiz

Band Edge

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Davis Instruments**
 Specification: **Band Edge Set up**
 Work Order #: **97253** Date: 11/10/2015
 Test Type: **Radiated Measurement**
 Tested By: Hieu Song Nguyenpham
 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 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

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

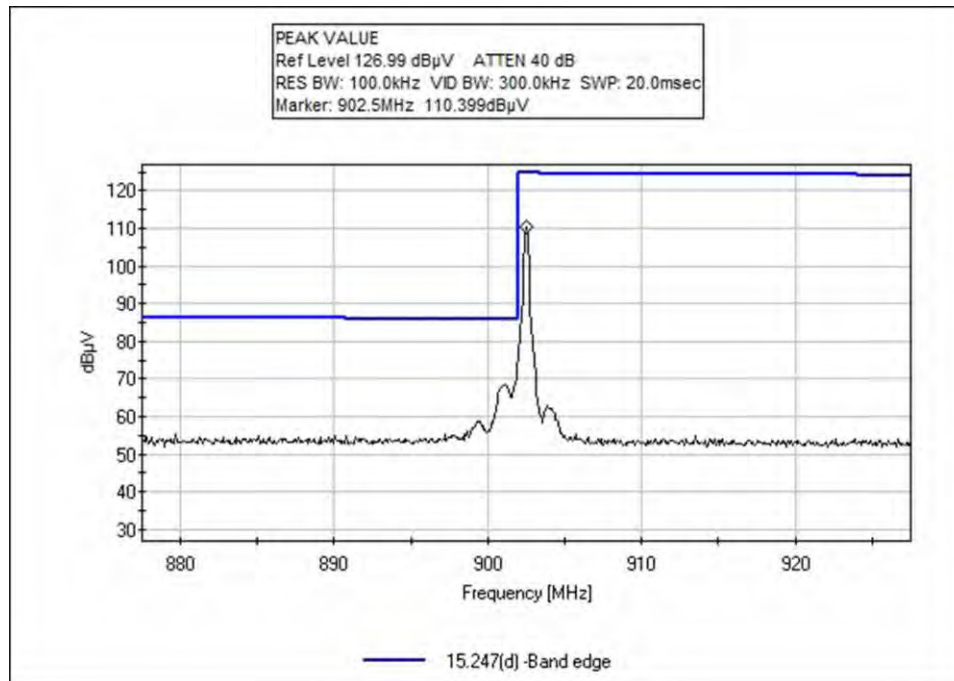
Temperature: 21.7°C
 Relative Humidity: 45 %
 Atmospheric Pressure: 101.9 kPa

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

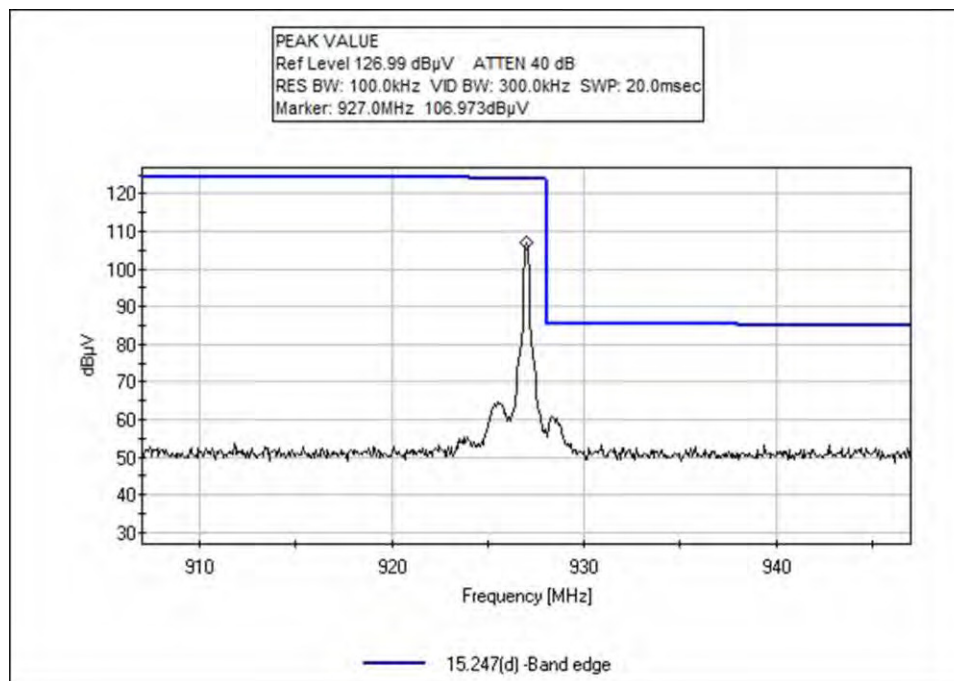
The EUT is placed on the table and set as set continuously transmitting or receiving as intended.
 The EUT is connected to four temperature probes to maximize a full load.

ISM Band on TX Mode

Band Edge Plots



Low Channel



High Channel

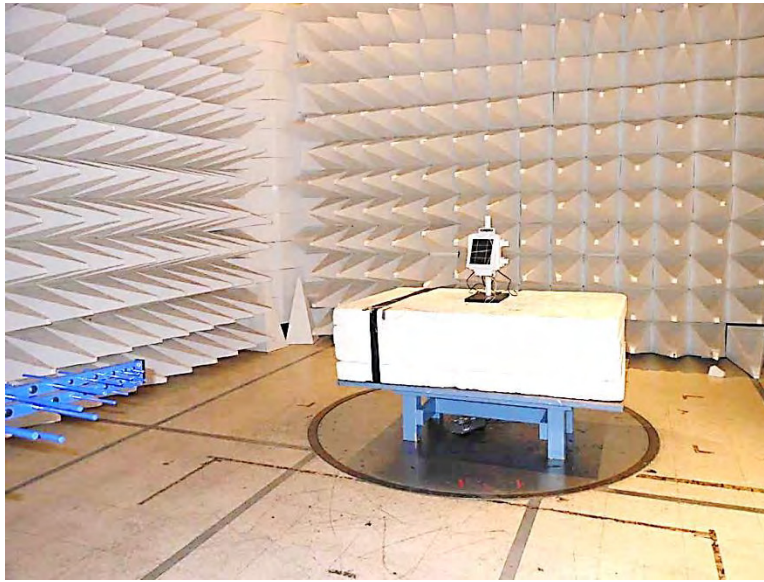
Test Setup Photos



9kHz – 30MHz



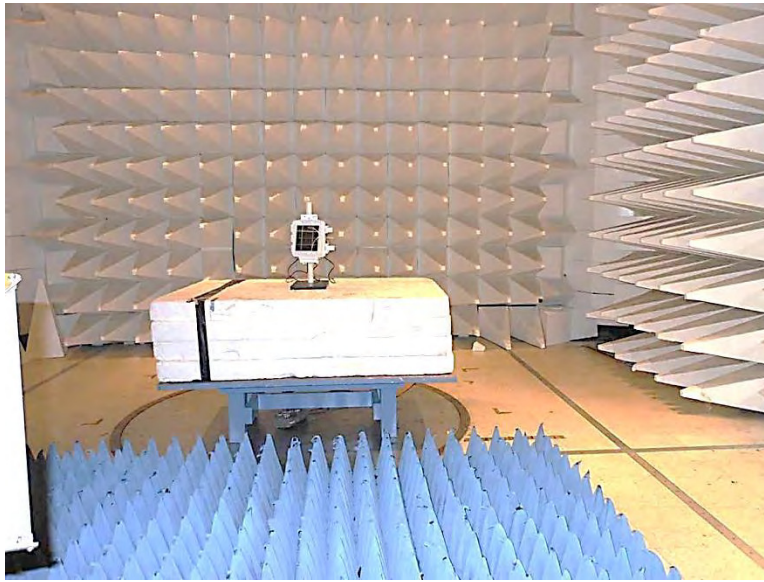
9kHz – 30MHz



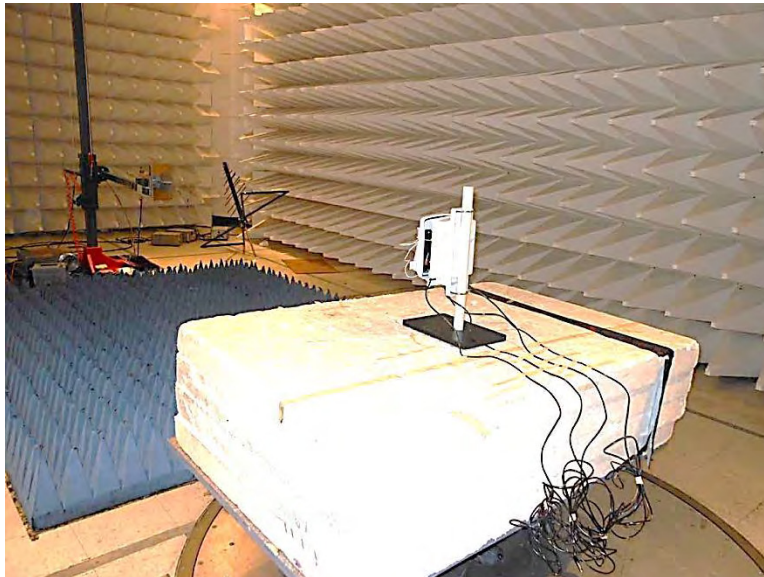
30MHz – 1GHz



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 μ V/m, the spectrum analyzer reading in dB μ 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 exceeding the limit while a positive margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ 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 carot ("^") 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.