

Davis Instruments

TEST REPORT FOR

**EnviroMonitor Ethernet Gateway, Model: 6805
AC/DC Adapter, Model: DSA-6PFG-05 FUS 050 100**

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

**15.207 & 15.247
(DTS 2400-2483.5 MHz)**

Report No.: 100904-15

Date of issue: February 28, 2019



Test Certificate # 803.06

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 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: Bruce Walter
Customer Reference Number: 90369

DATE OF EQUIPMENT RECEIPT:

DATE(S) OF TESTING:

REPORT PREPARED BY:

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

Project Number: 100904

November 20, 2018

November 20, and 26-27, 2018

Report Authorization

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



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

Test Facility Information



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

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

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont, CA	US0082	SL2-IN-E-1148R	3082B-1	US1023	A-0149

SUMMARY OF RESULTS

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

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

NA = Not Applicable

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

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 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
AC/DC Adapter	Davis Instruments	DSA-6PFG-05 FUS 050 100	NA
EnviroMonitor Ethernet Gateway	Davis Instruments	6805	FL-109

Support Equipment:

Device	Manufacturer	Model #	S/N
Router	Linksys	WRT54G	CDFD1F910025
ISS Transmitter	Davis Instruments	6322C	BC180823004
Laptop	Dell	Latitude E 6530	NA
RFID Omni Fiberglass Antenna	Ameison	AMXF-9092-8	NA

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
EnviroMonitor Ethernet Gateway	Davis Instruments	6805	EG-10
AC/DC Adapter	Davis Instruments	DSA-6PFG-05 FUS 050 100	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Latitude E 6530	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	BLE
Operating Frequency Range:	2400MHz to 2483.5MHz
Modulation Type(s):	GFSK
Maximum Duty Cycle:	100%
Number of TX Chains:	1
Number of RX Chains:	1
Antenna Type(s) and Gain:	1dBi
Beamforming Type:	NA
Antenna Connection Type:	Integral
Nominal Input Voltage:	120VAC/60Hz
Software used for Test:	nRFgo Studio-Win32 version 1.21.2

FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

Test Setup/Conditions

Test Location:	Fremont Lab C3	Test Engineer:	Hieu Song Nguyenpham
Test Method:	ANSI C63.10 (2013)	Test Date(s):	11/20/2018
Configuration:	3		
Test Setup:	The EUT is placed non-conducted table. It is operated as intended.		

Environmental Conditions

Temperature (°C)	20.5	Relative Humidity (%):	46.5
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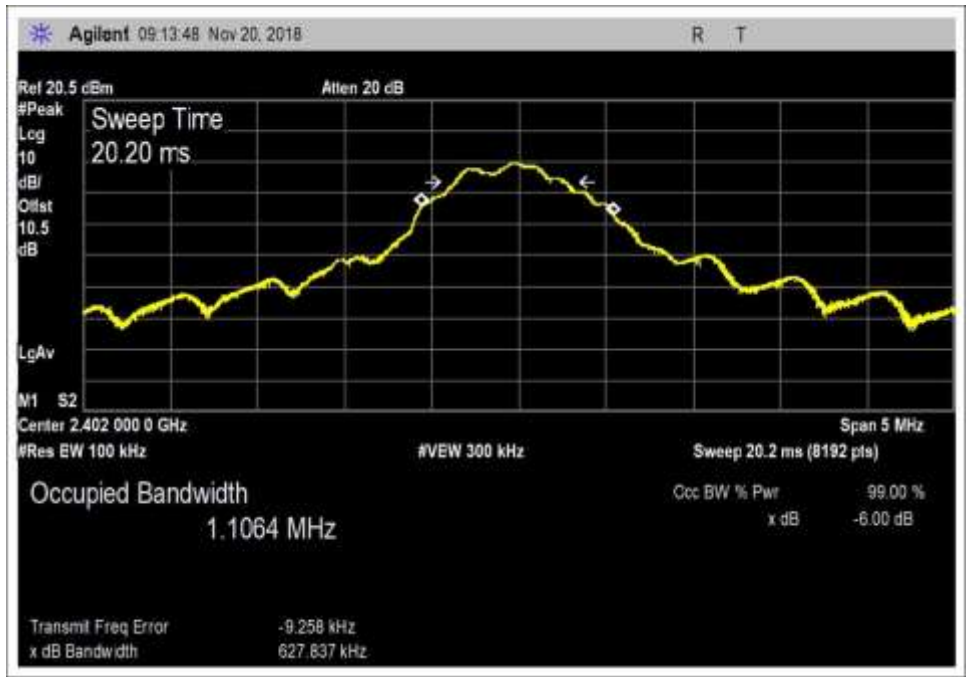
Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P06903	Cable	Astrolab	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
02660	Spectrum Analyzer	Agilent	E4446A	10/19/2018	10/19/2020

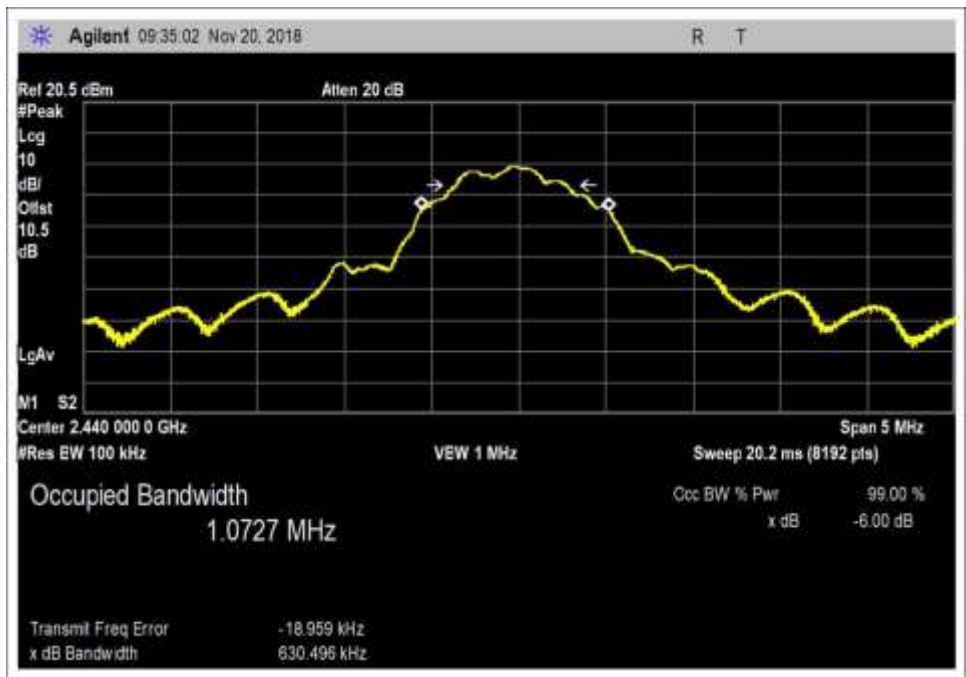
Test Data Summary

Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
2402	1	GFSK	627.837	≥500	Pass
2440	1	GFSK	630.496	≥500	Pass
2480	1	GFSK	627.727	≥500	Pass

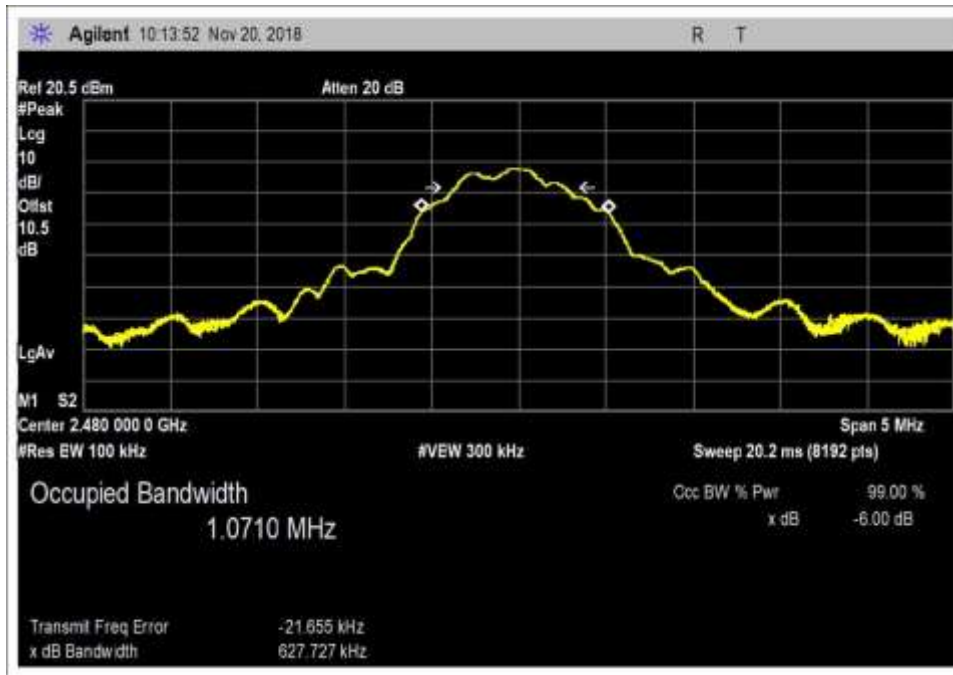
Plot(s)



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)



15.247(b)(3) Output Power

Test Setup / Conditions

Test Location:	Fremont Lab C3	Test Engineer:	Hieu Song Nguyenpham
Test Method:	ANSI C63.10 (2013)	Test Date(s):	11/20/2018
Configuration:	3		
Test Setup:	The EUT is placed non-conducted table. It is operated as intended.		

Environmental Conditions

Temperature (°C)	20.5	Relative Humidity (%):	46.5
------------------	------	------------------------	------

Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P06903	Cable	Astrolab	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
02660	Spectrum Analyzer	Agilent	E4446A	10/19/2018	10/19/2020

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V _{Minimum} (dBm)	V _{Nominal} (dBm)	V _{Maximum} (dBm)	Max Deviation from V _{Nominal} (dB)
2402	GFSK/External	0.37	0.39	0.39	0.2
2440	GFSK/External	-0.22	-0.23	-0.24	0.1
2480	GFSK/External	-1.50	-1.51	-1.51	0.1

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

Parameter Definitions:

Measurements performed at input voltage V_{Nominal} ± 15%.

Parameter	Value
V _{Nominal} :	120VAC
V _{Minimum} :	102VAC
V _{Maximum} :	138VAC

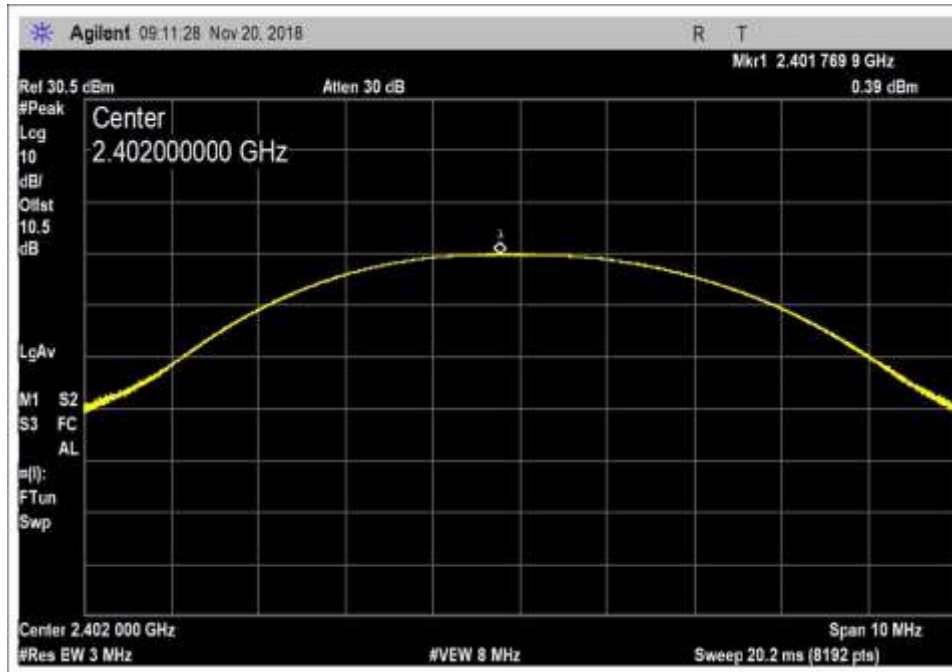
Power Output Test Data Summary - RF Conducted Measurement					
Measurement Option: RBW > DTS Bandwidth					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
2402	GFSK	Integral/1	0.39	≤30	Pass
2440	GFSK	Integral/1	-0.23	≤30	Pass
2480	GFSK	Integral/1	-1.51	≤30	Pass

For fixed point-to-point antennas, the limit is calculated in accordance with 15.247(c)(1):

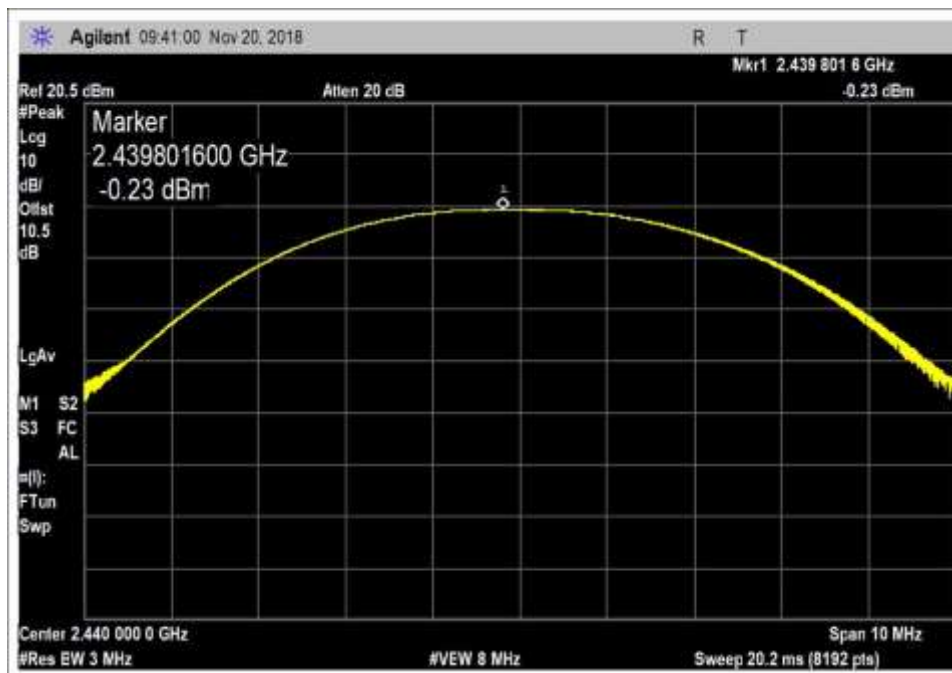
$$Limit = 30 - Roundup\left(\frac{G-6}{3}\right)$$

For directional beamforming antennas, the limit is calculated in accordance with 15.247(c)(2) and KDB 662911.

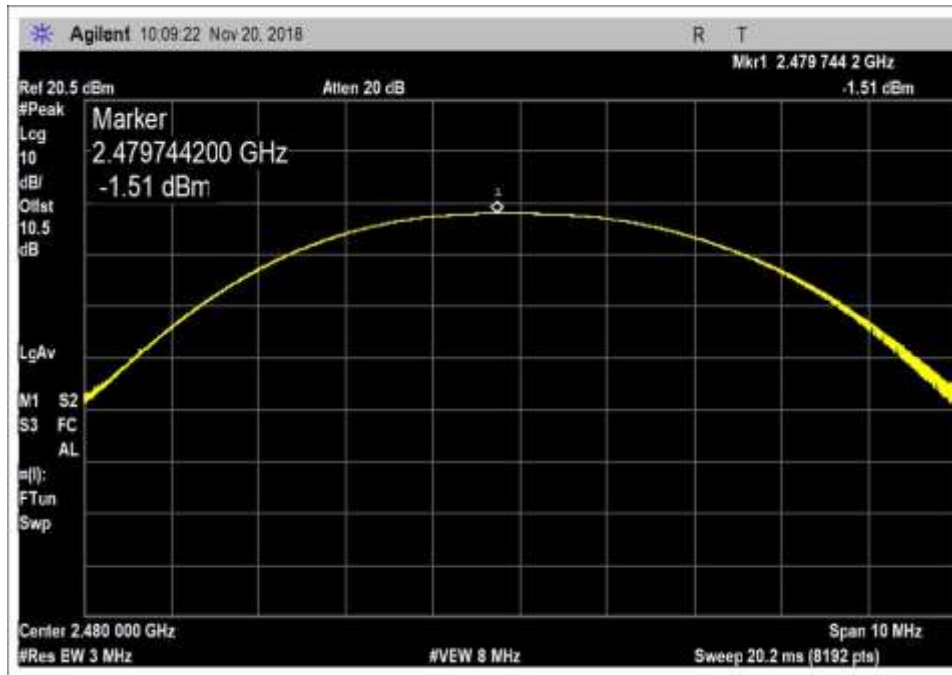
Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)



15.247(e) Power Spectral Density

Test Setup / Conditions / Data

Test Location:	Fremont Lab C3	Test Engineer:	Hieu Song Nguyenpham
Test Method:	ANSI C63.10 (2013)	Test Date(s):	11/20/2018
Configuration:	3		
Test Setup:	The EUT is placed non-conducted table. It is operated as intended.		

Environmental Conditions

Temperature (°C)	20.5	Relative Humidity (%):	46.5
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Test Equipment

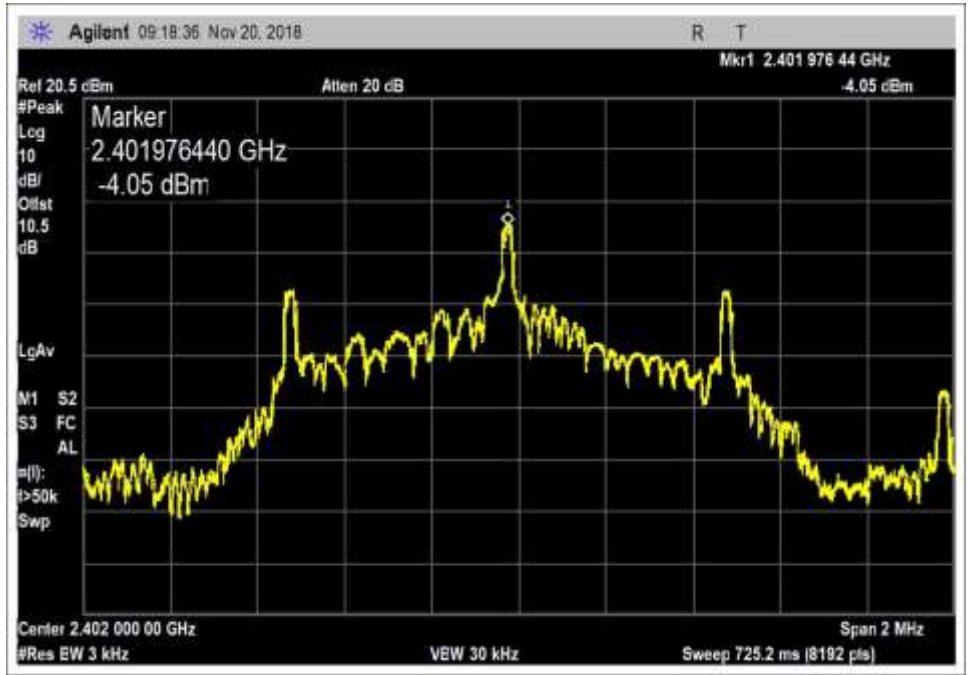
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P06903	Cable	Astrolab	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
02660	Spectrum Analyzer	Agilent	E4446A	10/19/2018	10/19/2020

PSD Test Data Summary - RF Conducted Measurement

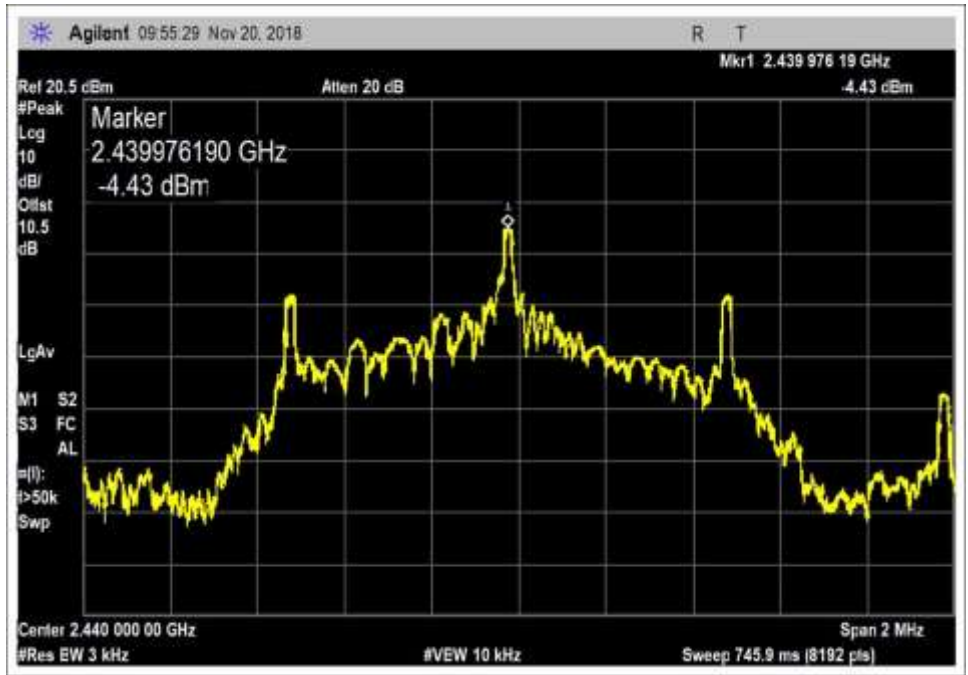
Measurement Method: PKPSD

Frequency (MHz)	Modulation	Measured (dBm/3kHz)	Limit (dBm/3kHz)	Results
2402	GFSK	-4.05	≤8	Pass
2440	GFSK	-4.43	≤8	Pass
2480	GFSK	-5.86	≤8	Pass

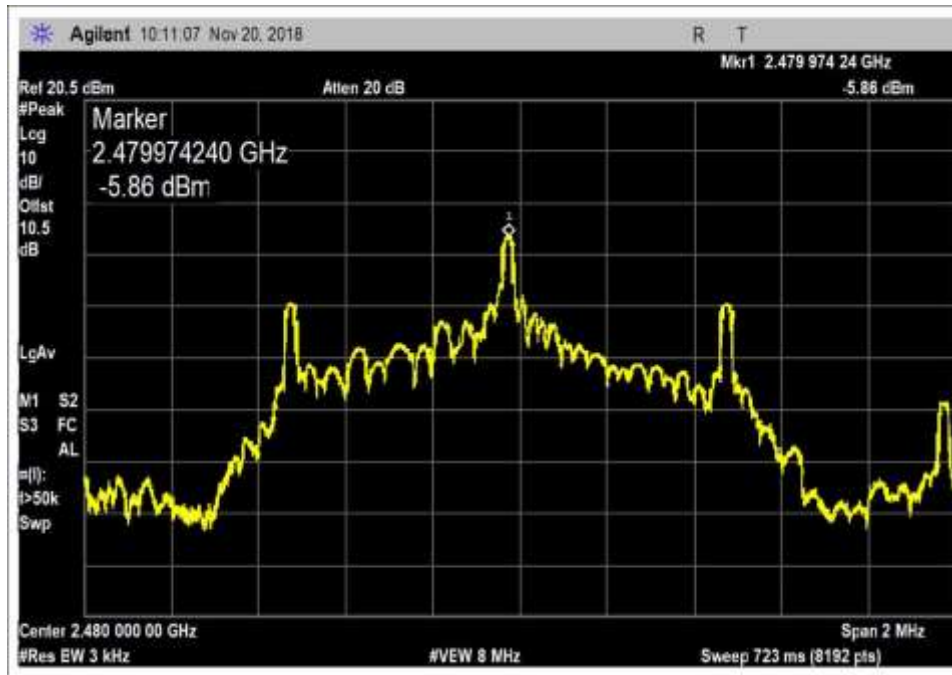
Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / 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 #: **100904** Date: 11/20/2018
 Test Type: **Conducted Spurious Emission** Time: 11:13:24 AM
 Tested By: Hieu Song Nguyenpham Sequence#: 6
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Conducted Emission
 Frequency Range: 9kHz to 25GHz

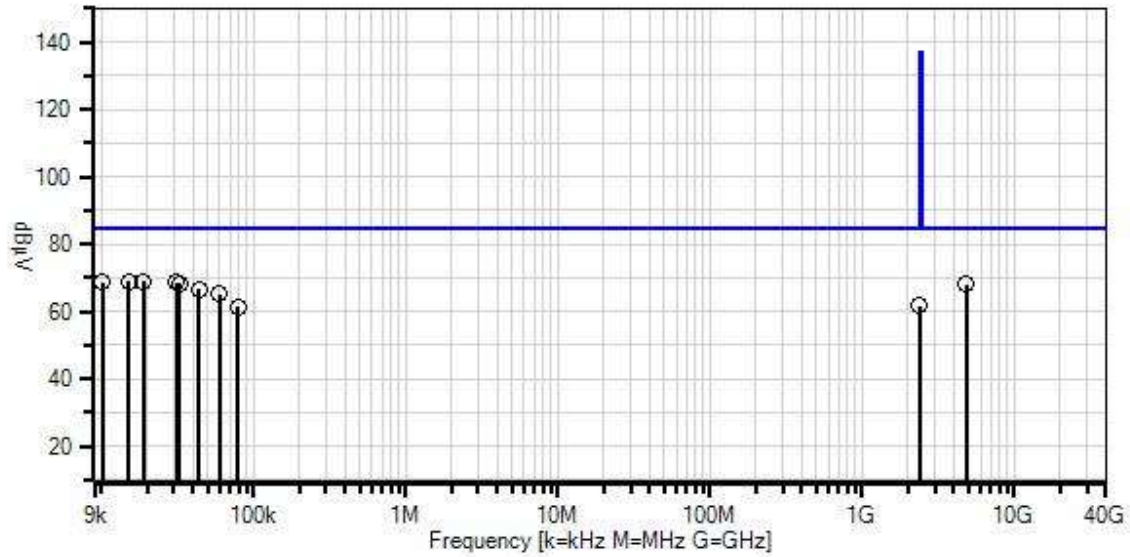
 Application: RFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 20.5°C
 Relative Humidity: 46.5 %
 Atmospheric Pressure: 101.6kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth = 1dBi

 RBW=100kHz
 VBW=300kHz

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

 Note
 Low Channel

Davis Instruments W/O#: 100904 Sequence#: 6 Date: 11/20/2018
 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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05411	Attenuator	54A-10	1/19/2018	1/19/2020
T2	ANP07192	Cable	32022-29094K- 29094K-48TC	10/9/2017	10/9/2019
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020

Measurement Data:

Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB		dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	18.910k	59.7	+9.2	+0.0			+0.0	68.9	84.8	-15.9	None
2	15.110k	59.6	+9.2	+0.0			+0.0	68.8	84.8	-16.0	None
3	10.219k	59.4	+9.2	+0.0			+0.0	68.6	84.8	-16.2	None
4	31.186k	59.4	+9.2	+0.0			+0.0	68.6	84.8	-16.2	None
5	32.830k	59.0	+9.2	+0.0			+0.0	68.2	84.8	-16.6	None
6	4804.234M	57.4	+9.4	+1.2			+0.0	68.0	84.8	-16.8	None
7	44.064k	57.4	+9.2	+0.0			+0.0	66.6	84.8	-18.2	None
8	59.824k	55.9	+9.2	+0.0			+0.0	65.1	84.8	-19.7	None
9	2390.001M	51.6	+9.3	+0.8			+0.0	61.7	84.8	-23.1	None
10	79.649k	52.3	+9.2	+0.0			+0.0	61.5	84.8	-23.3	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 #: **100904** Date: 11/20/2018
 Test Type: **Conducted Spurious Emission** Time: 11:35:38 AM
 Tested By: Hieu Song Nguyenpham Sequence#: 6
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Conducted Emission
 Frequency Range: 9kHz to 25GHz

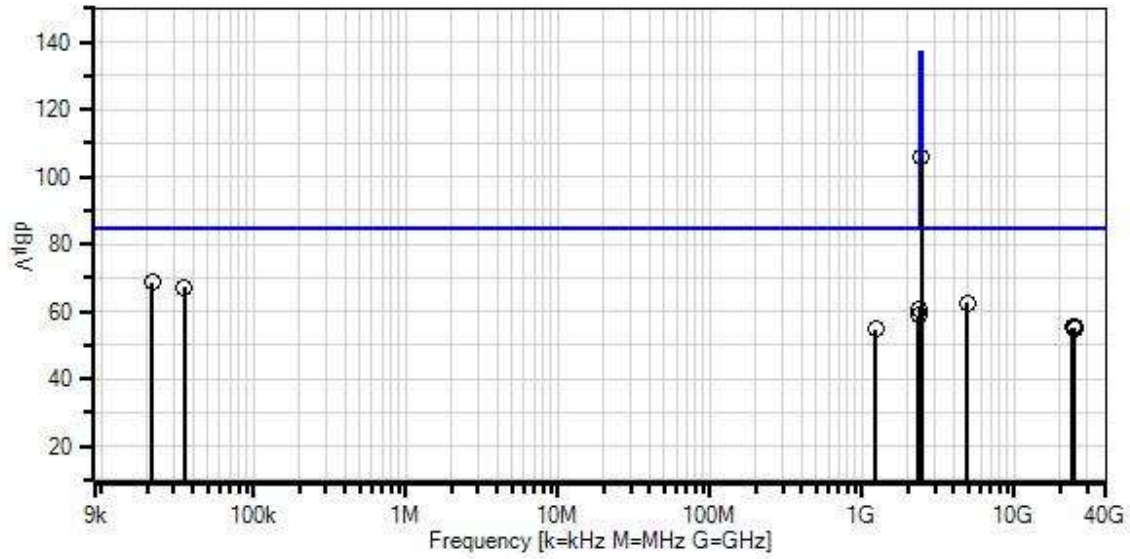
 Application: RFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 20.5°C
 Relative Humidity: 46.5 %
 Atmospheric Pressure: 101.6kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth = 1dBi

 RBW=100kHz
 VBW=300kHz

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

 Note
 Middle Channel

Davis Instruments W/O#: 100904 Sequence#: 6 Date: 11/20/2018
 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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05411	Attenuator	54A-10	1/19/2018	1/19/2020
T2	ANP07192	Cable	32022-29094K- 29094K-48TC	10/9/2017	10/9/2019
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020

Measurement Data:

Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB		dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	21.655k	59.3	+9.2	+0.0			+0.0	68.5	84.8	-16.3	None
2	35.202k	58.0	+9.2	+0.0			+0.0	67.2	84.8	-17.6	None
3	4877.329M	52.0	+9.4	+1.2			+0.0	62.6	84.8	-22.2	None
4	2390.454M	50.7	+9.3	+0.8			+0.0	60.8	84.8	-24.0	None
5	2335.758M	48.8	+9.3	+0.8			+0.0	58.9	84.8	-25.9	None
6	23911.933 M	42.4	+10.3	+2.7			+0.0	55.4	84.8	-29.4	None
7	24911.178 M	42.0	+10.4	+2.8			+0.0	55.2	84.8	-29.6	None
8	24711.329 M	41.7	+10.4	+2.8			+0.0	54.9	84.8	-29.9	None
9	1218.815M	44.9	+9.2	+0.6			+0.0	54.7	84.8	-30.1	None
10	2439.392M	95.7	+9.3	+0.8			+0.0	105.8	137.0	-31.2	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 #: **100904** Date: 11/20/2018
 Test Type: **Conducted Spurious Emission** Time: 11:50:45 AM
 Tested By: Hieu Song Nguyenpham Sequence#: 7
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Conducted Emission
 Frequency Range: 9kHz to 25GHz

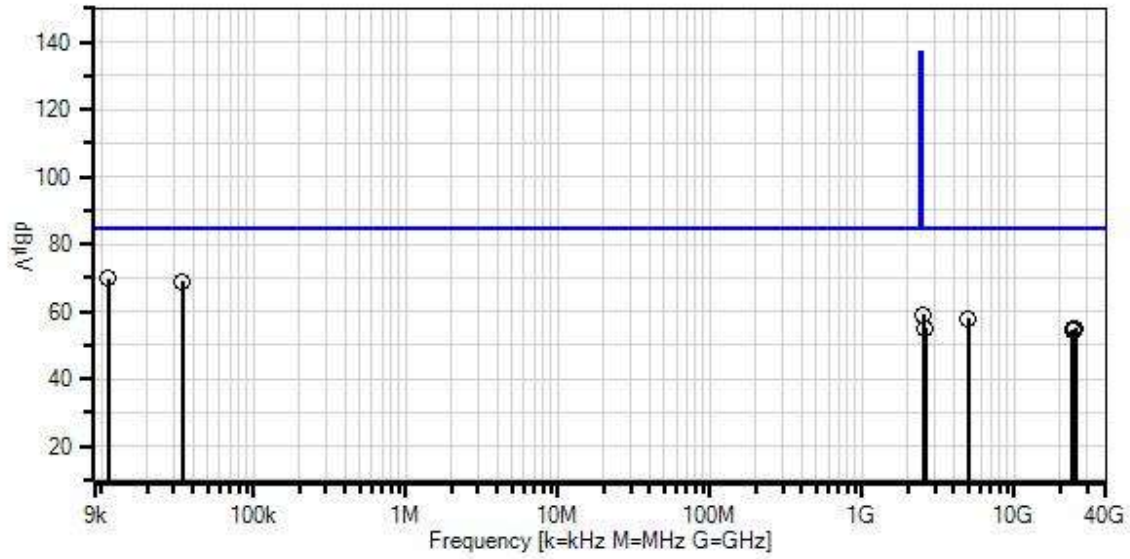
 Application: RFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 20.5°C
 Relative Humidity: 46.5 %
 Atmospheric Pressure: 101.6kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth = 1dBi

 RBW=100kHz
 VBW=300kHz

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

 Note
 High Channel

Davis Instruments W/O#: 100904 Sequence#: 7 Date: 11/20/2018
 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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05411	Attenuator	54A-10	1/19/2018	1/19/2020
T2	ANP07192	Cable	32022-29094K- 29094K-48TC	10/9/2017	10/9/2019
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020

Measurement Data:

Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB		dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	11.133k	60.5	+9.2	+0.0			+0.0	69.7	84.8	-15.1	None
2	34.132k	59.7	+9.2	+0.0			+0.0	68.9	84.8	-15.9	None
3	2511.360M	48.9	+9.3	+0.8			+0.0	59.0	84.8	-25.8	None
4	4955.935M	47.2	+9.4	+1.2			+0.0	57.8	84.8	-27.0	None
5	24966.692 M	41.9	+10.4	+2.8			+0.0	55.1	84.8	-29.7	None
6	2580.449M	44.8	+9.3	+0.8			+0.0	54.9	84.8	-29.9	None
7	23889.727 M	41.8	+10.3	+2.7			+0.0	54.8	84.8	-30.0	None
8	24644.713 M	41.7	+10.4	+2.7			+0.0	54.8	84.8	-30.0	None
9	24800.151 M	41.4	+10.4	+2.8			+0.0	54.6	84.8	-30.2	None
10	24522.583 M	41.3	+10.4	+2.7			+0.0	54.4	84.8	-30.4	None

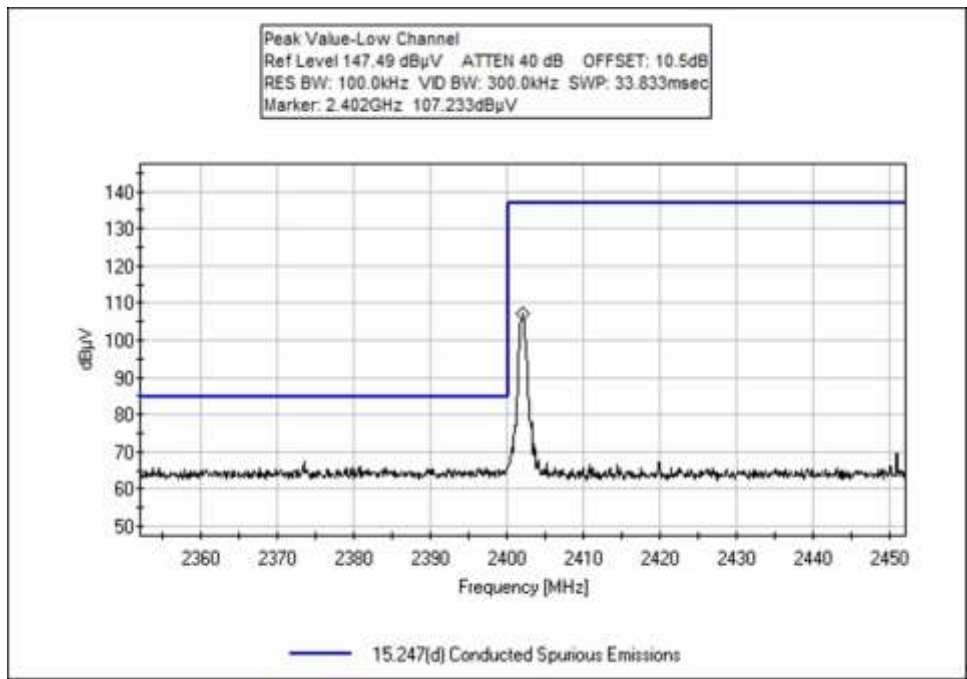
Band Edge

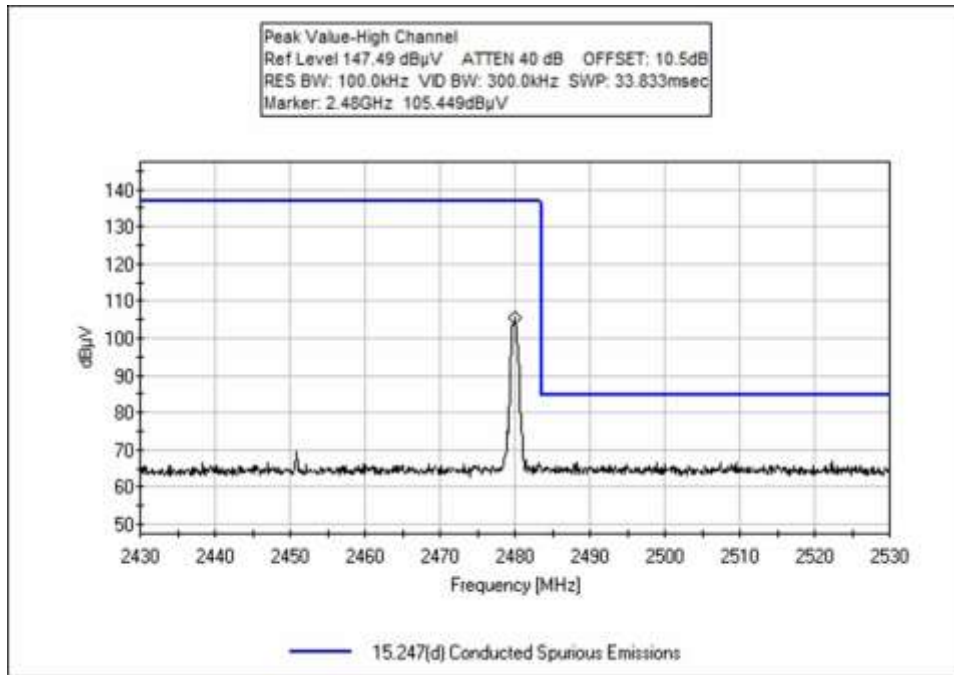
Band Edge Summary

Limit applied: Max Power/100kHz - 20dB.

Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
2400.0	GFSK	-40.5	< -19.61	Pass
2483.5	GFSK	-41.2	< -21.51	Pass

Band Edge Plots





Test Setup Photo(s)



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Davis Instruments**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100904** Date: 11/26/2018
 Test Type: **Radiated Scan** Time: 11:17:45
 Tested By: Hieu Song Nguyenpham Sequence#: 33
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

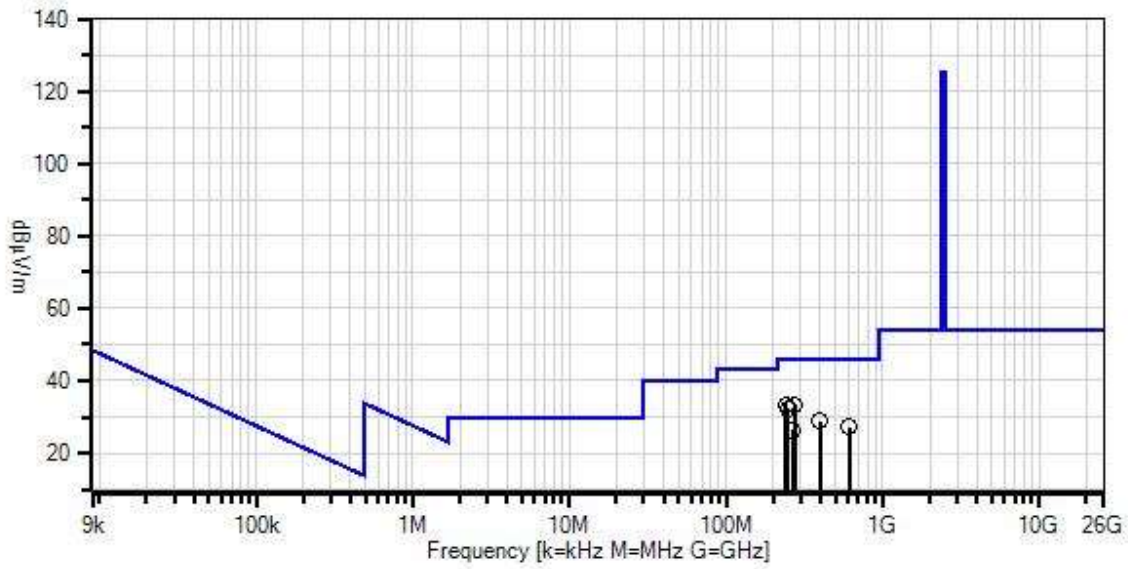
Radiated Emission
 Frequency Range: 9kHz to 1000MHz

 Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 22.5°C
 Relative Humidity: 43 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth= 1dBi
 Method: ANSI C 63.10 2013

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

Note
 BLE on TX
 Low Channel

Davis Instruments WO#: 100904 Sequence#: 33 Date: 11/26/2018
 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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07508	Preamp	310N	10/15/2018	10/15/2020
T2	ANP06049	Attenuator	PE7002-6	5/14/2018	5/14/2020
T3	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T4	ANP01187	Cable	CNT-195	8/20/2018	8/20/2020
T5	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T6	AN00852	Biconilog Antenna	CBL 6111C	5/1/2018	5/1/2020
	AN00226	Loop Antenna	6502	6/1/2018	6/1/2020

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	T5	T6			Table	dB μ V/m	dB μ V/m	dB	Ant
1	275.047M	43.9	-32.0 +0.6	+6.0 +13.0	+1.6	+0.3	+0.0	33.4	46.0	-12.6	Vert
2	240.813M	45.0	-32.0 +0.6	+6.0 +12.0	+1.5	+0.3	+0.0	33.4	46.0	-12.6	Vert
3	249.942M	42.9	-32.0 +0.6	+6.0 +12.6	+1.6	+0.3	+0.0	32.0	46.0	-14.0	Vert
4	399.972M	35.5	-31.9 +0.8	+6.0 +15.8	+2.1	+0.4	+0.0	28.7	46.0	-17.3	Horiz
5	610.783M	29.5	-32.1 +0.9	+6.0 +19.8	+2.6	+0.6	+0.0	27.3	46.0	-18.7	Horiz
6	268.561M	37.1	-32.0 +0.6	+6.0 +12.9	+1.6	+0.3	+0.0	26.5	46.0	-19.5	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 #: **100904** Date: 11/27/2018
 Test Type: **Radiated Scan** Time: 14:14:39
 Tested By: Hieu Song Nguyenpham Sequence#: 68
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

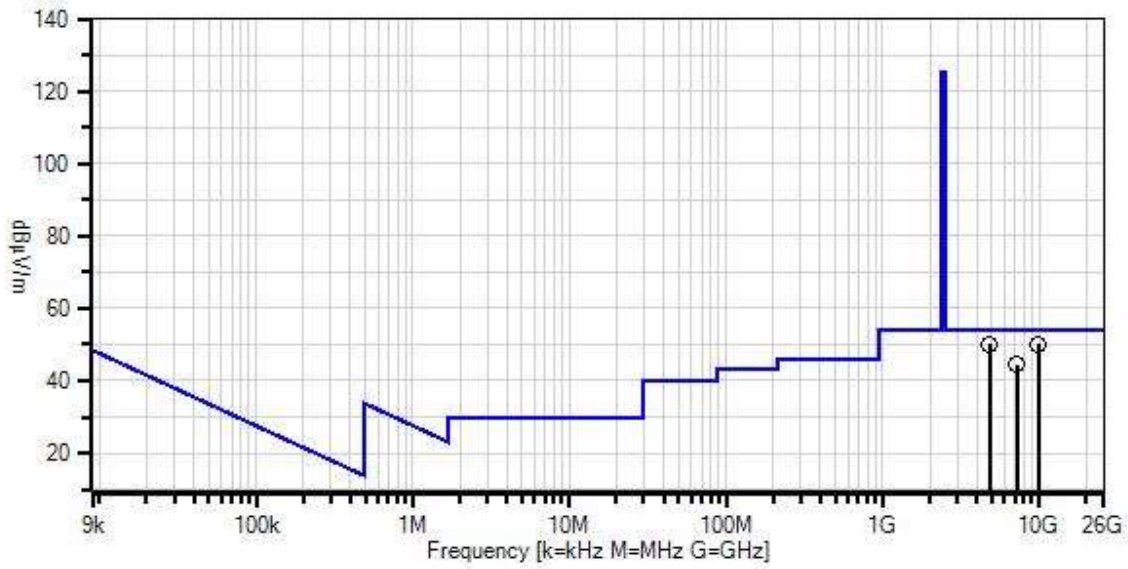
Radiated Emission
 Frequency Range: 1000MHz to 25000MHz

 Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 23.5°C
 Relative Humidity: 48 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth= 1dBi
 Method: ANSI C 63.10 2013

 The EUT is placed on the table and set as set continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

 Note
 BLE on TX
 Low Channel

Davis Instruments WO#: 100904 Sequence#: 68 Date: 11/27/2018
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
 - × QP Readings
 - ▼ Ambient
 - 1 - 15.247(d) / 15.209 Radiated Spurious Emissions
 - Peak Readings
 - * Average Readings
- Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T1	AN03607	Preamp	AMF-7D-00101800-30-10P	6/6/2017	6/6/2019
T2	AN02157	Horn Antenna-ANSI C63.5	3115	2/6/2017	2/6/2019
T3	AN03302	Cable	32026-29094K-29094K-72TC	1/15/2018	1/15/2020
T4	ANP01210	Cable	FSJ1P-50A-4A	1/16/2017	1/16/2019
T5	ANP06903	Cable	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
T6	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	3/16/2018	3/16/2020
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/11/2017	5/11/2019
	AN02694	Horn Antenna-ANSI C63.5 Calibration	AMFW-5F-18002650-20-10P	5/11/2017	5/11/2019
	ANP00928	Cable	various	1/15/2018	1/15/2020
	ANP00929	Cable	various	1/15/2018	1/15/2020
	ANP06126	Cable	32022-29094K-29094K-168TC	3/27/2017	3/27/2019
	ANP06899	Cable	32022-29094K-29094K-72TC	1/4/2018	1/4/2020

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	Reading listed by margin.				Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
			T1 dB	T2 dB	T3 dB	T4 dB					
1	4802.801M	69.6	-59.0 +0.9	+32.9 +0.1	+1.8	+3.9	+0.0	50.2	54.0	-3.8	Vert
2	9927.921M	60.3	-59.2 +1.1	+39.0 +0.1	+2.7	+6.1	+0.0	50.1	54.0	-3.9	Vert
3	7204.950M	59.7	-59.0 +1.0	+35.6 +0.1	+2.3	+4.8	+0.0	44.5	54.0	-9.5	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 #: **100904** Date: 11/26/2018
 Test Type: **Radiated Scan** Time: 11:34:53
 Tested By: Hieu Song Nguyenpham Sequence#: 36
 Software: EMITest 5.03.11

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: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 22.5°C
 Relative Humidity: 43 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth= 1dBi
 Method: ANSI C 63.10 2013

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

Note
 BLE on TX
 Middle Channel

Davis Instruments WO#: 100904 Sequence#: 36 Date: 11/26/2018
 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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07508	Preamp	310N	10/15/2018	10/15/2020
T2	ANP06049	Attenuator	PE7002-6	5/14/2018	5/14/2020
T3	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T4	ANP01187	Cable	CNT-195	8/20/2018	8/20/2020
T5	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T6	AN00852	Biconilog Antenna	CBL 6111C	5/1/2018	5/1/2020
	AN00226	Loop Antenna	6502	6/1/2018	6/1/2020

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	T5	T6			Table	dB μ V/m	dB μ V/m	dB	Ant
1	240.509M	48.6	-32.0 +0.6	+6.0 +12.0	+1.5	+0.3	+0.0	37.0	46.0	-9.0	Horiz
2	249.985M	46.9	-32.0 +0.6	+6.0 +12.6	+1.6	+0.3	+0.0	36.0	46.0	-10.0	Horiz
3	275.011M	45.4	-32.0 +0.6	+6.0 +13.0	+1.6	+0.3	+0.0	34.9	46.0	-11.1	Horiz
4	325.064M	40.1	-32.0 +0.7	+5.9 +14.0	+1.8	+0.4	+0.0	30.9	46.0	-15.1	Vert
5	253.629M	40.3	-32.0 +0.6	+6.0 +12.7	+1.6	+0.3	+0.0	29.5	46.0	-16.5	Vert
6	331.381M	36.3	-31.9 +0.7	+5.9 +14.2	+1.8	+0.4	+0.0	27.4	46.0	-18.6	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 #: **100904** Date: 11/27/2018
 Test Type: **Radiated Scan** Time: 14:42:35
 Tested By: Hieu Song Nguyenpham Sequence#: 71
 Software: EMITest 5.03.11

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: 1000MHz to 25000MHz

Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 23.5°C
 Relative Humidity: 48 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth= 1dBi
 Method: ANSI C 63.10 2013

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

Note
 BLE on TX
 Middle Channel

Davis Instruments WO#: 100904 Sequence#: 71 Date: 11/27/2018
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
 - × QP Readings
 - ▼ Ambient
 - 1 - 15.247(d) / 15.209 Radiated Spurious Emissions
 - Peak Readings
 - * Average Readings
- Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T1	AN03607	Preamp	AMF-7D-00101800-30-10P	6/6/2017	6/6/2019
T2	AN02157	Horn Antenna-ANSI C63.5	3115	2/6/2017	2/6/2019
T3	AN03302	Cable	32026-29094K-29094K-72TC	1/15/2018	1/15/2020
T4	ANP01210	Cable	FSJ1P-50A-4A	1/16/2017	1/16/2019
T5	ANP06903	Cable	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
T6	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	3/16/2018	3/16/2020
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/11/2017	5/11/2019
	AN02694	Horn Antenna-ANSI C63.5 Calibration	AMFW-5F-18002650-20-10P	5/11/2017	5/11/2019
	ANP00928	Cable	various	1/15/2018	1/15/2020
	ANP00929	Cable	various	1/15/2018	1/15/2020
	ANP06126	Cable	32022-29094K-29094K-168TC	3/27/2017	3/27/2019
	ANP06899	Cable	32022-29094K-29094K-72TC	1/4/2018	1/4/2020

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	9763.120M	58.2	-59.1 +1.1	+38.6 +0.1	+2.7	+6.0	+0.0	47.6	54.0	-6.4	Vert
2	7323.117M	57.3	-59.4 +1.0	+35.9 +0.1	+2.3	+4.9	+0.0	42.1	54.0	-11.9	Vert
3	4883.117M Ave	54.0	-59.2 +0.9	+33.1 +0.1	+1.9	+4.0	+0.0	34.8	54.0	-19.2	Vert
^	4883.117M	70.5	-59.2 +0.9	+33.1 +0.1	+1.9	+4.0	+0.0	51.3	54.0	-2.7	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 #: **100904** Date: 11/26/2018
 Test Type: **Radiated Scan** Time: 11:47:36
 Tested By: Hieu Song Nguyenpham Sequence#: 39
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

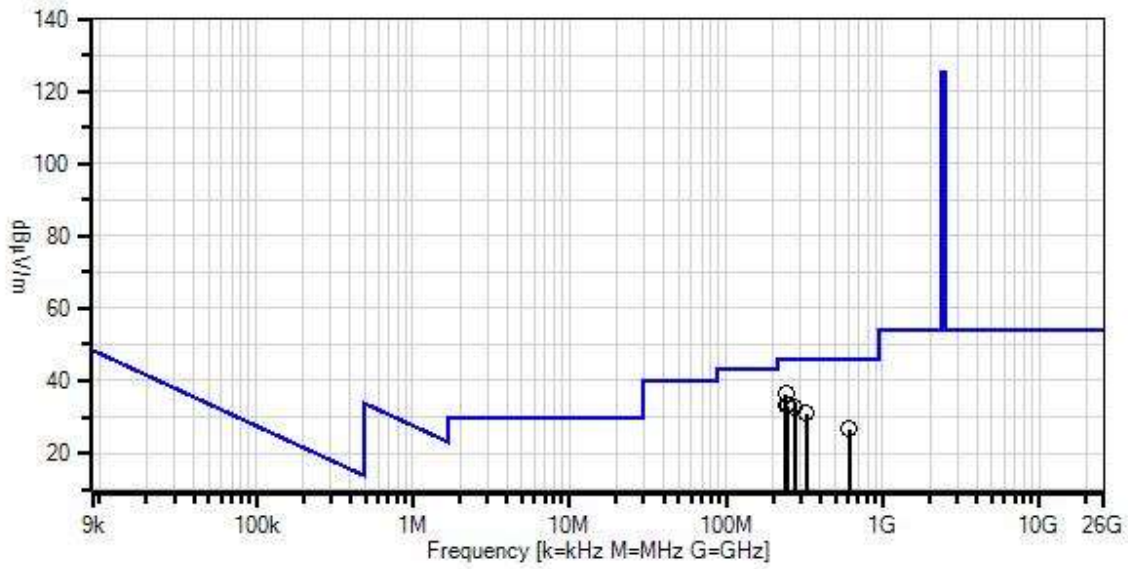
Radiated Emission
 Frequency Range: 9kHz to 1000MHz

Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 22.5°C
 Relative Humidity: 43 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth= 1dBi
 Method: ANSI C 63.10 2013

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

Note
 BLE on TX
 High Channel

Davis Instruments WO#: 100904 Sequence#: 39 Date: 11/26/2018
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
 - × QP Readings
 - ▼ Ambient
 - 1 - 15.247(d) / 15.209 Radiated Spurious Emissions
 - Peak Readings
 - * Average Readings
- Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07508	Preamp	310N	10/15/2018	10/15/2020
T2	ANP06049	Attenuator	PE7002-6	5/14/2018	5/14/2020
T3	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T4	ANP01187	Cable	CNT-195	8/20/2018	8/20/2020
T5	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T6	AN00852	Biconilog Antenna	CBL 6111C	5/1/2018	5/1/2020
	AN00226	Loop Antenna	6502	6/1/2018	6/1/2020

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5		T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
			T2 dB	T6 dB							
1	240.266M	47.9	-32.0 +0.6	+6.0 +12.0	+1.5	+0.3	+0.0	36.3	46.0	-9.7	Horiz
2	241.967M	44.8	-32.0 +0.6	+6.0 +12.1	+1.5	+0.3	+0.0	33.3	46.0	-12.7	Vert
3	249.985M	43.9	-32.0 +0.6	+6.0 +12.6	+1.6	+0.3	+0.0	33.0	46.0	-13.0	Vert
4	275.011M	43.2	-32.0 +0.6	+6.0 +13.0	+1.6	+0.3	+0.0	32.7	46.0	-13.3	Vert
5	325.064M	40.2	-32.0 +0.7	+5.9 +14.0	+1.8	+0.4	+0.0	31.0	46.0	-15.0	Horiz
6	608.840M	28.9	-32.1 +0.9	+6.0 +19.8	+2.6	+0.6	+0.0	26.7	46.0	-19.3	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 #: **100904** Date: 11/27/2018
 Test Type: **Radiated Scan** Time: 15:17:23
 Tested By: Hieu Song Nguyenpham Sequence#: 74
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

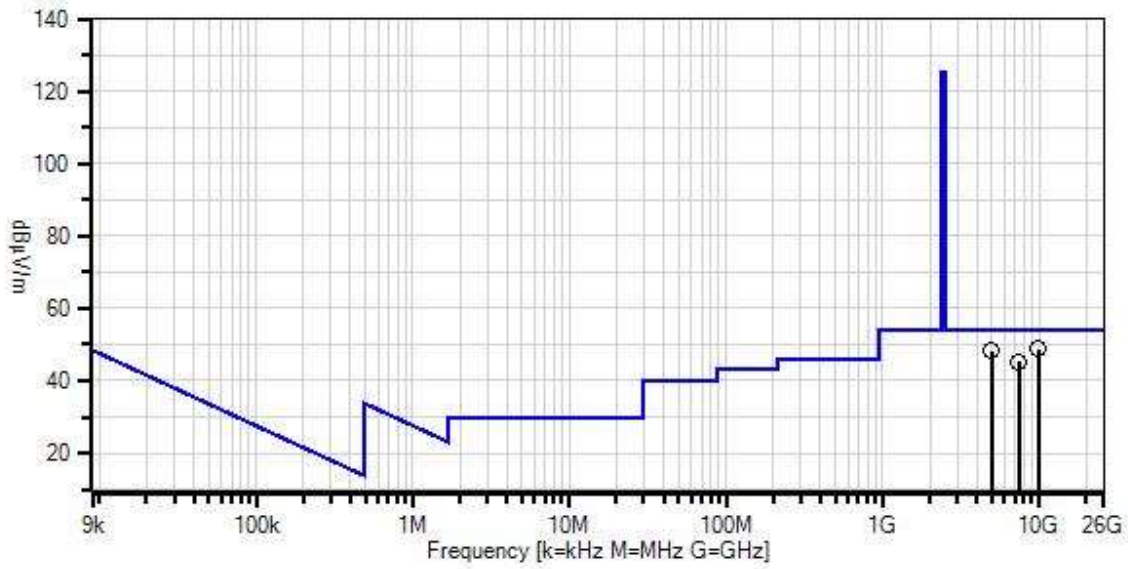
Radiated Emission
 Frequency Range: 1000MHz to 25000MHz

Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 23.5°C
 Relative Humidity: 48 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth= 1dBi
 Method: ANSI C 63.10 2013

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

Note
 BLE on TX
 High Channel

Davis Instruments WO#: 100904 Sequence#: 74 Date: 11/27/2018
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters



- Readings
 - × QP Readings
 - ▼ Ambient
 - 1 - 15.247(d) / 15.209 Radiated Spurious Emissions
 - Peak Readings
 - * Average Readings
- Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T1	AN03607	Preamp	AMF-7D-00101800-30-10P	6/6/2017	6/6/2019
T2	AN02157	Horn Antenna-ANSI C63.5	3115	2/6/2017	2/6/2019
T3	AN03302	Cable	32026-29094K-29094K-72TC	1/15/2018	1/15/2020
T4	ANP01210	Cable	FSJ1P-50A-4A	1/16/2017	1/16/2019
T5	ANP06903	Cable	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
T6	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	3/16/2018	3/16/2020
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/11/2017	5/11/2019
	AN02694	Horn Antenna-ANSI C63.5 Calibration	AMFW-5F-18002650-20-10P	5/11/2017	5/11/2019
	ANP00928	Cable	various	1/15/2018	1/15/2020
	ANP00929	Cable	various	1/15/2018	1/15/2020
	ANP06126	Cable	32022-29094K-29094K-168TC	3/27/2017	3/27/2019
	ANP06899	Cable	32022-29094K-29094K-72TC	1/4/2018	1/4/2020

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

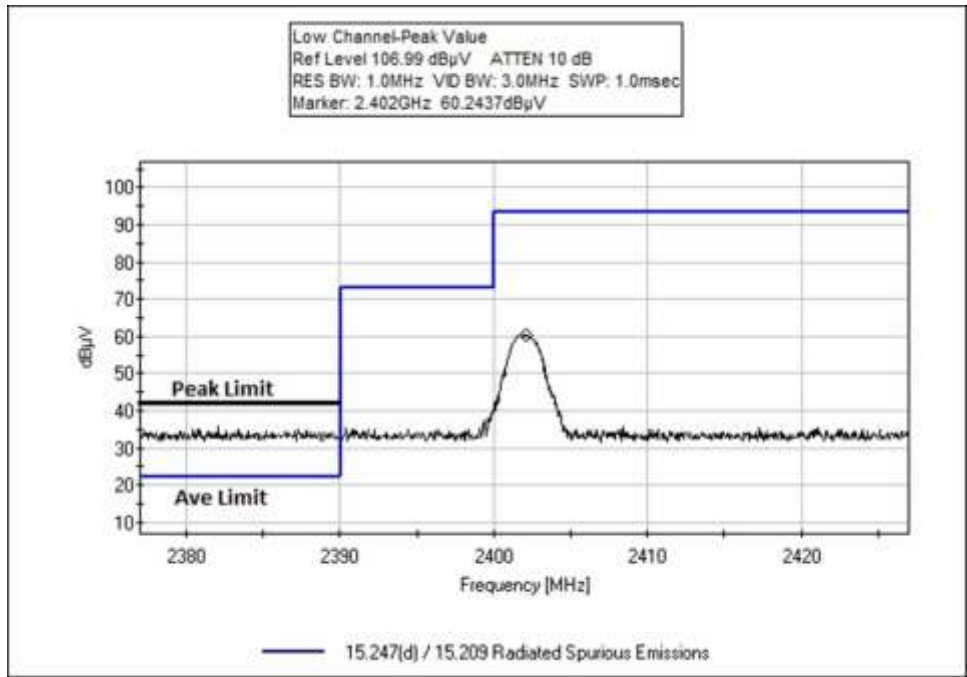
#	Freq MHz	Rdng dB μ V	Reading listed by margin.				Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
			T1 dB	T2 dB	T3 dB	T4 dB					
1	9923.720M	59.0	-59.2 +1.1	+39.0 +0.1	+2.7	+6.1	+0.0	48.8	54.0	-5.2	Vert
2	4959.840M	67.1	-59.1 +0.9	+33.3 +0.1	+1.9	+4.0	+0.0	48.2	54.0	-5.8	Vert
3	7440.300M	59.7	-59.2 +1.0	+36.2 +0.1	+2.4	+5.0	+0.0	45.2	54.0	-8.8	Vert

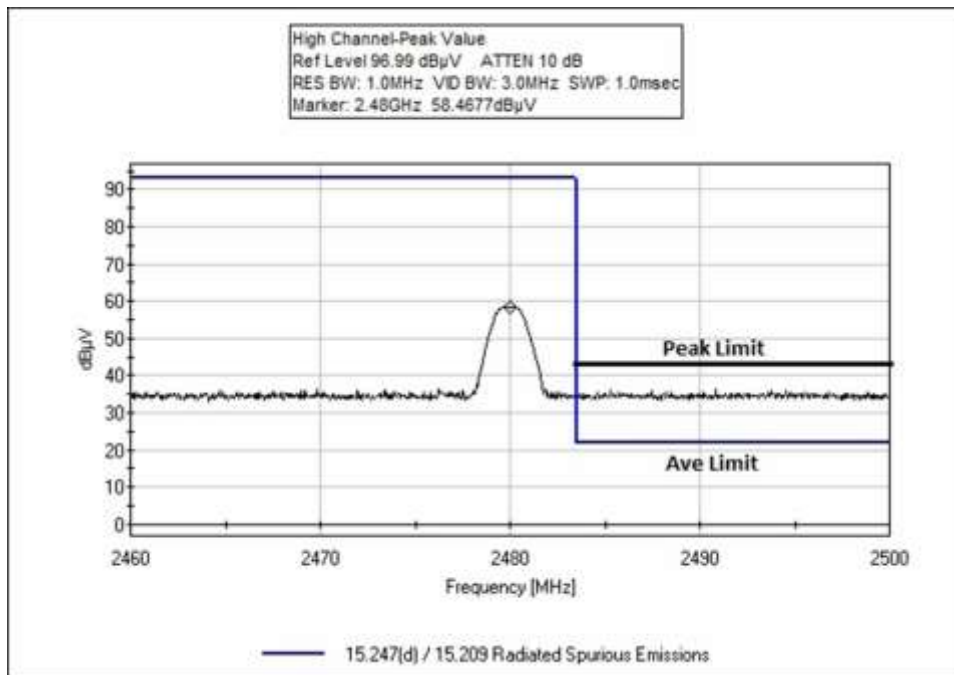
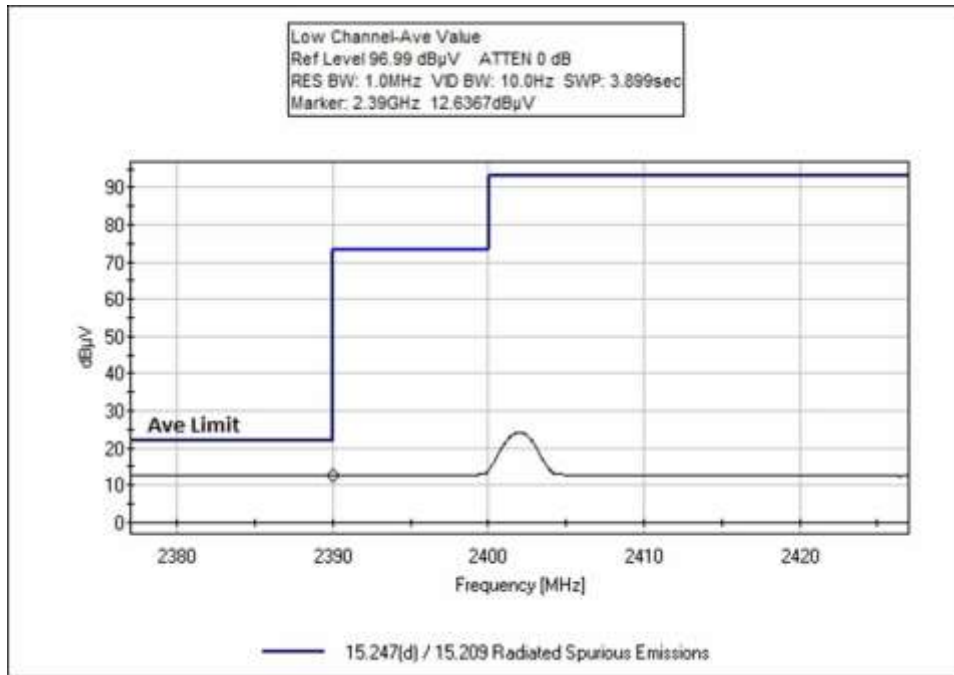
Band Edge

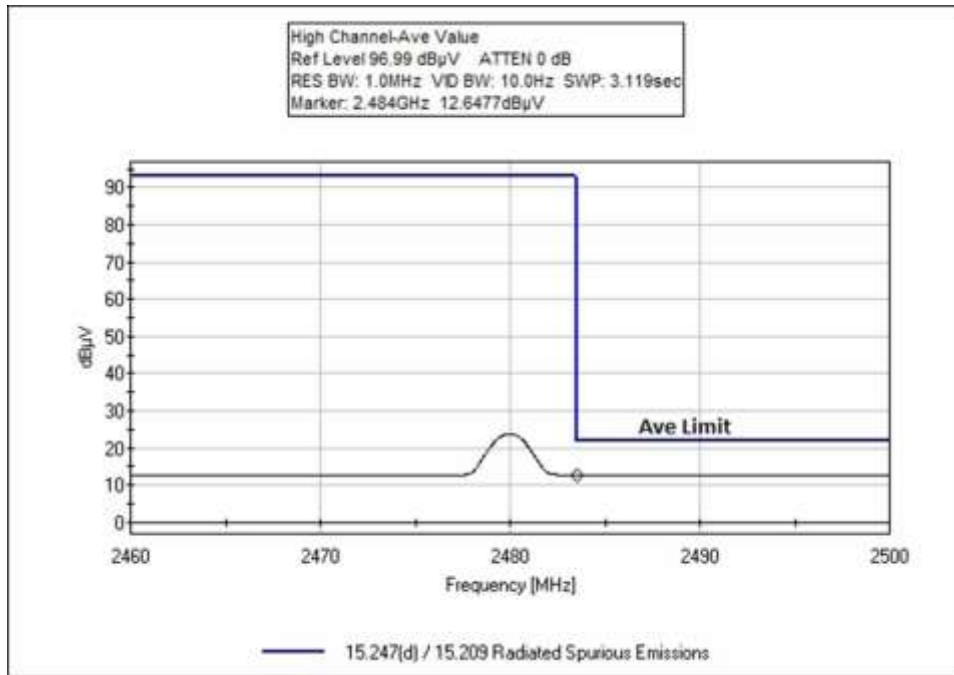
Band Edge Summary

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2390.0	GFSK	Integral	43.637	<54	Pass
2483.5	GFSK	Integral	44.647	<54	Pass

Band Edge Plots







Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 •
 Customer: **Davis Instruments**
 Specification: Band Edge
 Work Order #: **100904** Date: 11/26/2018
 Test Type: **Radiated Scan** Time:
 Tested By: Hieu Song Nguyenpham Sequence#: 1
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Band Edge

 Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 22.3°C
 Relative Humidity: 43 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna = 1dBi
 Method: ANSI C 63.10 2013

 The EUT is placed on the table and set as set continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT.

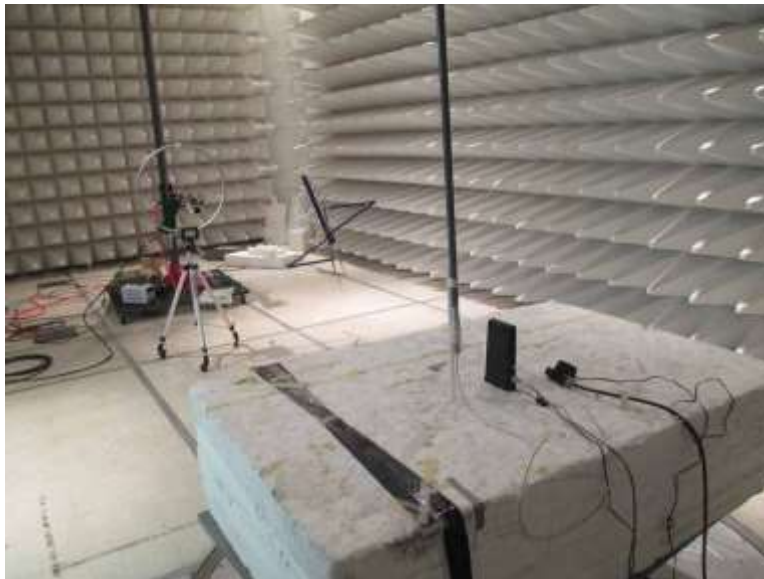
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02157	Horn Antenna- ANSI C63.5	3115	2/6/2017	2/6/2019
	AN03302	Cable	Astrolab	32026-29094K- 29094K-72TC	1/15/2018
	ANP01210	Cable	FSJ1P-50A-4A	1/16/2017	1/16/2019
	AN02660	Spectrum Analyzer	E4446A	10/19/2018	10/19/2020

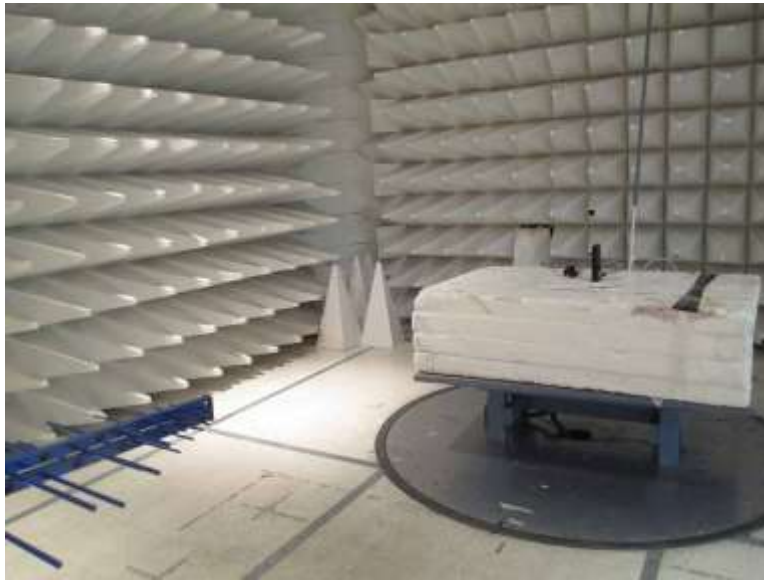
Test Setup Photo(s)



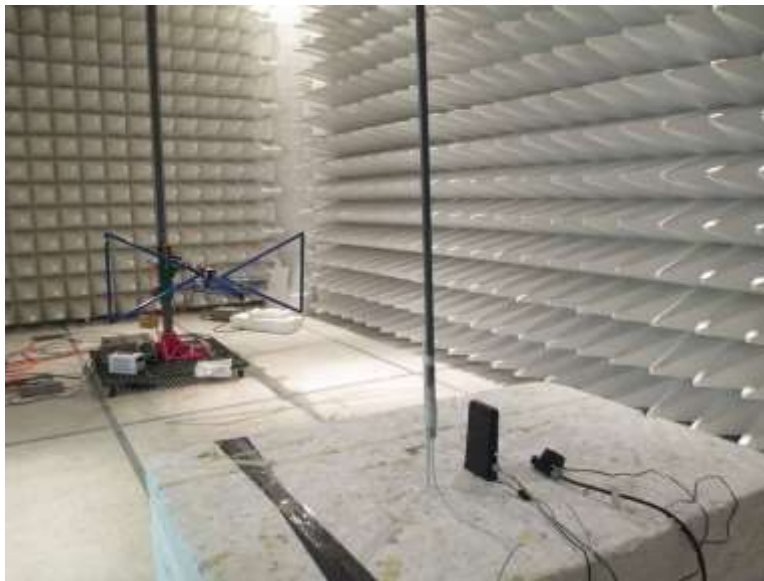
9kHz – 30MHz



9kHz – 30MHz



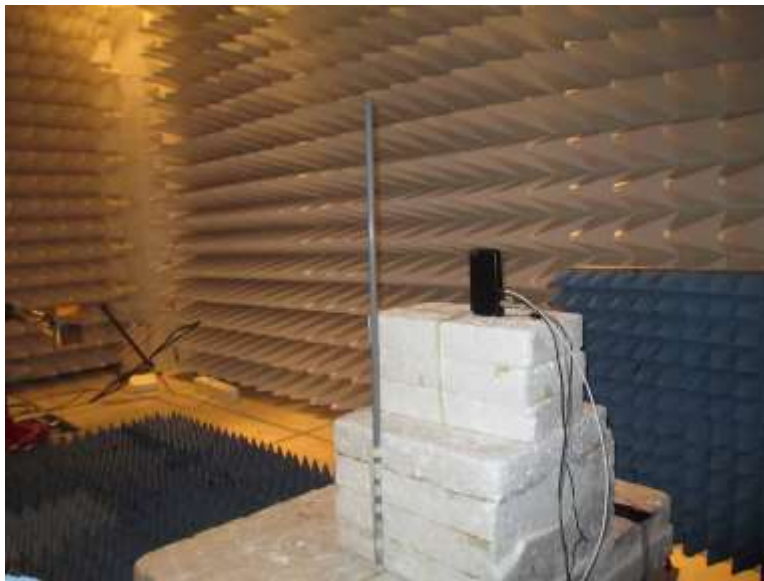
30MHz – 1GHz



30MHz – 1GHz



1 – 25GHz, Cone placement



1 – 25GHz, Cone placement

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Davis Instruments**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **100904** Date: 11/20/2018
 Test Type: **Conducted Emissions** Time: 3:41:32 PM
 Tested By: Hieu Song Nguyenpham Sequence#: 14
 Software: EMITest 5.03.11 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

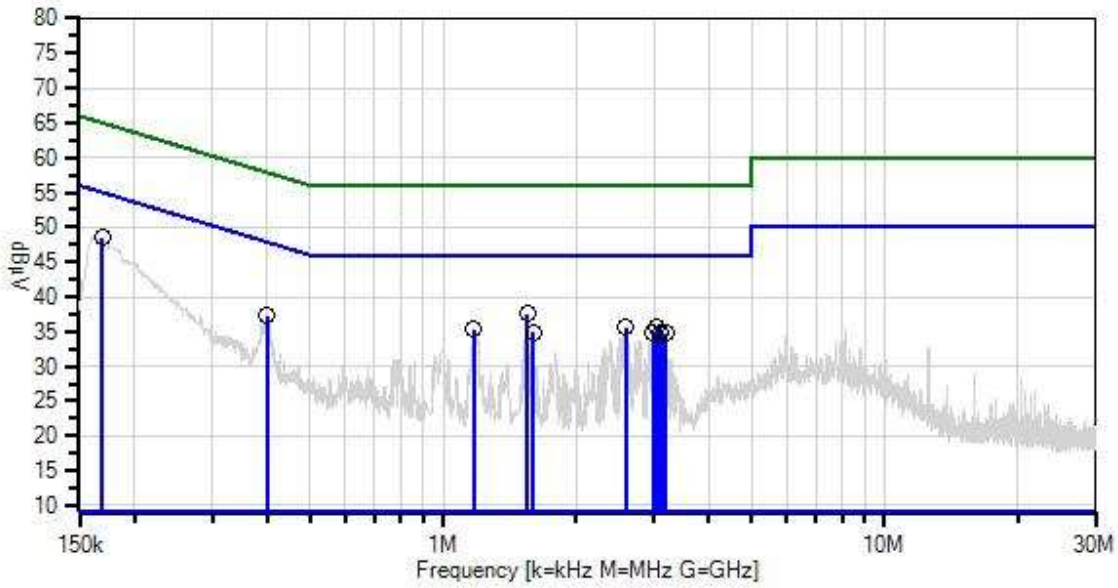
Conducted Emission
 Frequency Range: 150kHz to 30MHz

 Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 20.5°C
 Relative Humidity: 46.5 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth and WiFi= 1dBi
 Method: ANSI C 63.10 2013

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

Note
 BLE on TX Mode at Middle Channel

Davis Instruments WO#: 100904 Sequence#: 14 Date: 11/20/2018
 15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data
 x QP Readings
 Software Version: 5.03.11
 — Readings
 * Average Readings
 — 1 - 15.207 AC Mains - Average
 ○ Peak Readings
 ▼ Ambient
 — 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/20/2017	2/20/2019
T2	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T3	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
T4	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/1/2017	3/1/2019
	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/1/2017	3/1/2019
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T5	ANP05258	High Pass Filter	HE9615-150K-50-720B	9/19/2018	9/19/2020

Measurement Data:

Reading listed by margin.

Test Lead: Line

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	168.907k	38.2	+9.9 +0.3	+0.0	+0.0	+0.1	+0.0	48.5	55.0	-6.5	Line
2	1.553M	27.3	+9.9 +0.1	+0.1	+0.0	+0.1	+0.0	37.5	46.0	-8.5	Line
3	2.587M	25.3	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	35.6	46.0	-10.4	Line
4	3.059M	25.3	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	35.6	46.0	-10.4	Line
5	399.431k	27.3	+9.9 +0.1	+0.0	+0.0	+0.0	+0.0	37.3	47.9	-10.6	Line
6	1.171M	25.1	+9.9 +0.1	+0.1	+0.0	+0.1	+0.0	35.3	46.0	-10.7	Line
7	1.596M	24.7	+9.9 +0.1	+0.1	+0.0	+0.1	+0.0	34.9	46.0	-11.1	Line
8	2.987M	24.6	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	34.9	46.0	-11.1	Line
9	3.110M	24.5	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	34.8	46.0	-11.2	Line
10	3.191M	24.5	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	34.8	46.0	-11.2	Line



Test Location: CKC Laboratories Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249-1170
 Customer: **Davis Instruments**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **100904** Date: 11/20/2018
 Test Type: **Conducted Emissions** Time: 3:53:04 PM
 Tested By: Hieu Song Nguyenpham Sequence#: 15
 Software: EMITest 5.03.11 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

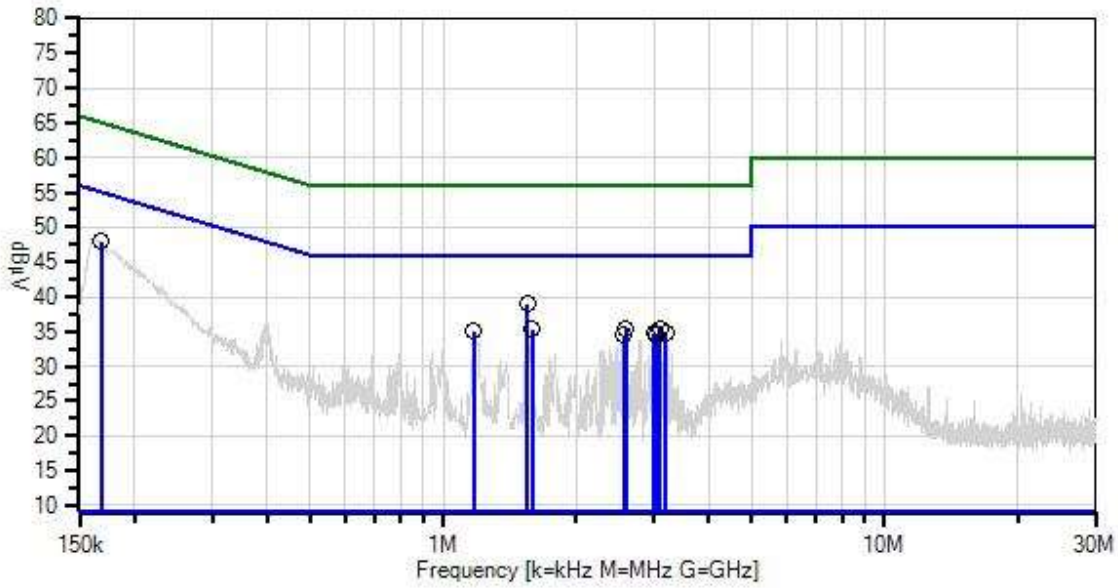
Conducted Emission
 Frequency Range: 150kHz to 30MHz

 Application: nRFgo Studio-Win32 version 1.21.2 for BTLE module
 Temperature: 20.5°C
 Relative Humidity: 46.5 %
 Atmospheric Pressure: 101.18 kPa
 High Clock: 40MHz
 Transmitting operating frequency= 2402, 2440 and 2480MHz for Bluetooth
 Gain of the antenna for Bluetooth and WiFi= 1dBi
 Method: ANSI C 63.10 2013

 The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is connected to the Router and ISS Transmitter which is outside of the chamber through RJ45 and RJ11 cables to active all the function of the EUT

 Note
 BLE on TX Mode at Middle Channel

Davis Instruments WO#: 100904 Sequence#: 15 Date: 11/20/2018
 15.207 AC Mains - Average Test Lead: 120V 60Hz



— Sweep Data
 x QP Readings
 Software Version: 5.03.11
 — Readings
 * Average Readings
 — 1 - 15.207 AC Mains - Average
 o Peak Readings
 ▼ Ambient
 — 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	2/20/2017	2/20/2019
T2	ANP00880	Cable	RG214U	5/14/2018	5/14/2020
T3	ANP06691	Cable	PE3062-180	5/14/2018	5/14/2020
	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/1/2017	3/1/2019
T4	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/1/2017	3/1/2019
	AN03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
T5	ANP05258	High Pass Filter	HE9615-150K-50-720B	9/19/2018	9/19/2020

Measurement Data:

Reading listed by margin.

Test Lead: Neutral

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	168.180k	37.8	+9.9 +0.3	+0.0	+0.0	+0.0	+0.0	48.0	55.0	-7.0	Neutr
2	1.553M	28.9	+9.9 +0.1	+0.1	+0.0	+0.0	+0.0	39.0	46.0	-7.0	Neutr
3	2.591M	25.3	+9.9 +0.1	+0.1	+0.1	+0.0	+0.0	35.5	46.0	-10.5	Neutr
4	3.106M	25.2	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	35.5	46.0	-10.5	Neutr
5	1.592M	25.2	+9.9 +0.1	+0.1	+0.0	+0.0	+0.0	35.3	46.0	-10.7	Neutr
6	1.171M	24.9	+9.9 +0.1	+0.1	+0.0	+0.0	+0.0	35.0	46.0	-11.0	Neutr
7	3.195M	24.6	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	34.9	46.0	-11.1	Neutr
8	2.999M	24.5	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	34.8	46.0	-11.2	Neutr
9	3.042M	24.3	+9.9 +0.1	+0.1	+0.1	+0.1	+0.0	34.6	46.0	-11.4	Neutr
10	2.570M	24.3	+9.9 +0.1	+0.1	+0.1	+0.0	+0.0	34.5	46.0	-11.5	Neutr

Test Setup Photo(s)



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

Uncertainties reported are worst case for all CKC Laboratories’ sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

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

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

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

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV 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 subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBμV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBμV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

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

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

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

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

Peak

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

Quasi-Peak

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

Average

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