

Navdy

TEST REPORT FOR

Human Interface Device Model: Dial

Tested to The Following Standards:

FCC Part 15 Subpart C Section 15.249

Report No.: 98680-13

Date of issue: June 14, 2016



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

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

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Navdy
575 7th Street
San Francisco, CA 94103

Representative: Soren Curry
Customer Reference Number: 1272

REPORT PREPARED BY:

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Mariposa, CA 95338

Project Number: 98680

DATE OF EQUIPMENT RECEIPT:
DATE(S) OF TESTING:

May 27, 2016
May 27-31, 2016

Report Authorization

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



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

Test Facility Information



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

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.249

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

NA = Not Applicable

NA¹ = Not applicable because the EUT only operates from non-rechargeable battery power.

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
Human Interface Device	Navdy	Dial	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Xantrex	XTS 30-2X	58738

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	GFSK
Maximum Duty Cycle:	5%
Antenna Gain and type	0.5dBi, chip antenna (monopole)
Antenna Connection Type:	Integral
Nominal Input Voltage:	3.2Vdc

FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	5/27/2016
Configuration:	1		
Test Condition			
	The EUT is placed on a Styrofoam platform at 1.5m height. The EUT is set to transmit continuously at 99% duty cycle. The EUT is powered from 3.2VDC power supply to simulate fresh battery installed. The EUT is tested in three orthogonal axes. Operating frequency: 2402-2480MHz BLE modulation: GFSK Tested frequency: 2402MHz, 2440MHz, 2480MHz RBW=18kHz, VBW=56kHz		

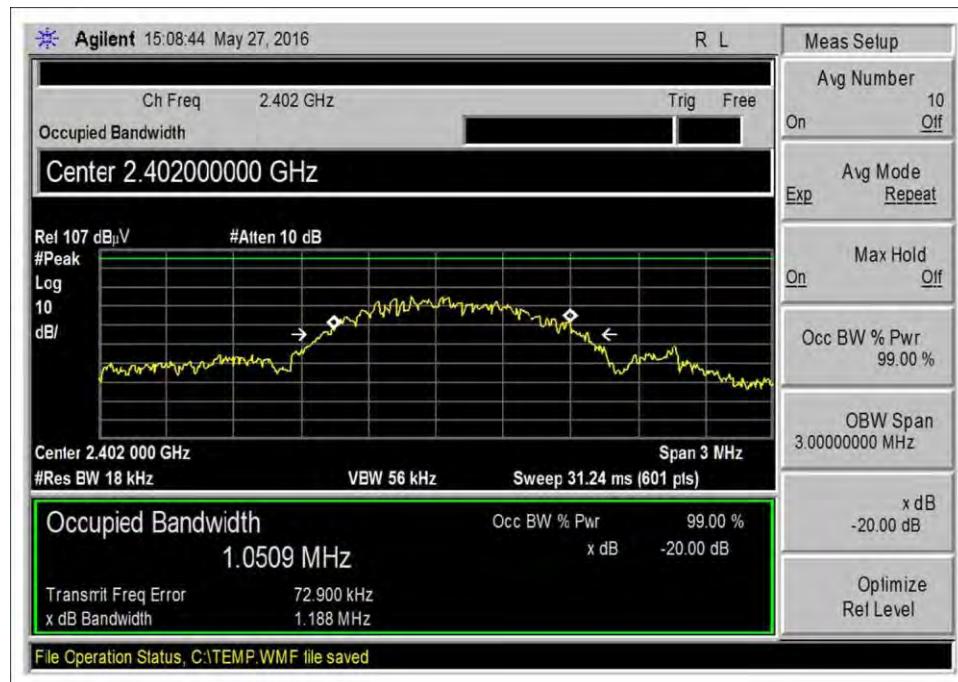
Environmental Conditions			
Temperature (°C)	22	Relative Humidity (%):	49

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
00786	Preamp	HP	83017A	5/9/2016	5/9/2018
00849	Horn Antenna	ETS	3115	3/4/2016	3/4/2018
P06544	Cable	Astro Steel	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
P06661	Cable	Andrew	LDF1-50	5/6/2016	5/6/2018
02672	Spectrum Analyzer	Agilent	E4446A	9/30/2015	9/30/2017

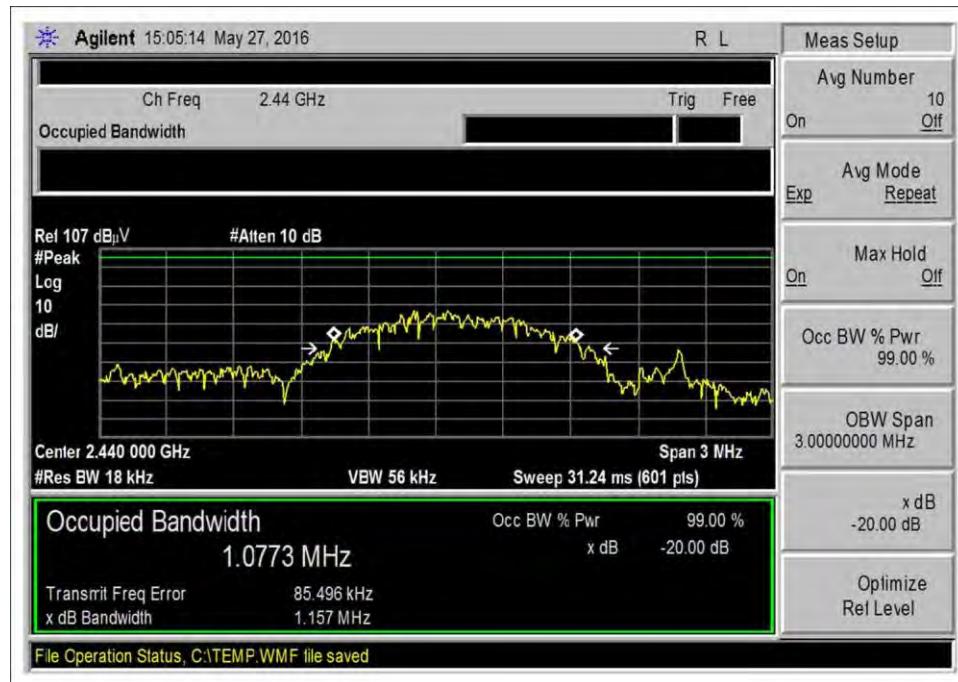
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
2402	Integral	GFSK	1188	None	NA
2440	Integral	GFSK	1157	None	NA
2480	Integral	GFSK	1191	None	NA

NA = Not Applicable

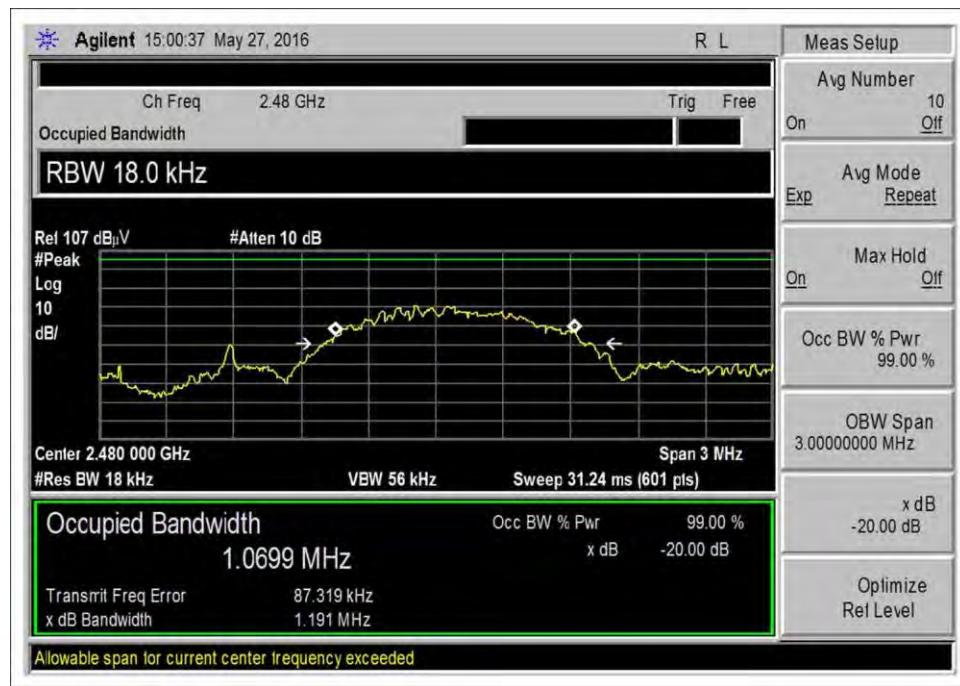
Plot(s)



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)





X Axis



Y Axis



Z Axis

15.249(a) Field Strength of Fundamental

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V _{Minimum} (dBuV/m)	V _{Nominal} (dBuV/m)	V _{Maximum} (dBuV/m)	Max Deviation from V _{Nominal} (dB)
2402	GFSK/ Integral	NA	82.1	NA	NA
2440	GFSK/ Integral	NA	79.0	NA	NA
2480	GFSK/ Integral	NA	75.9	NA	NA

NA = Not Applicable - This equipment is battery powered. Power output tests were performed using a fresh battery. Test performed using operational mode with the highest output power, representing worst case.

Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

Parameter	Value
V _{Nominal} :	3.2 VDC
V _{Minimum} :	1.8 VDC
V _{Maximum} :	3.2 VDC

Test Data Summary - Voltage Variations

This equipment is battery powered. Power output tests were performed using a fresh battery.

Test Data Summary – Radiated Field Strength Measurement

Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
2402	GFSK	Integral	82.1	≤94	Pass
2440	GFSK	Integral	79.0	≤94	Pass
2480	GFSK	Integral	75.9	≤94	Pass

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112
 Customer: **Navdy**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: **98680** Date: 5/27/2016
 Test Type: **Maximized Emissions** Time: 13:49:27
 Tested by: Don Nguyen Sequence#: 0
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

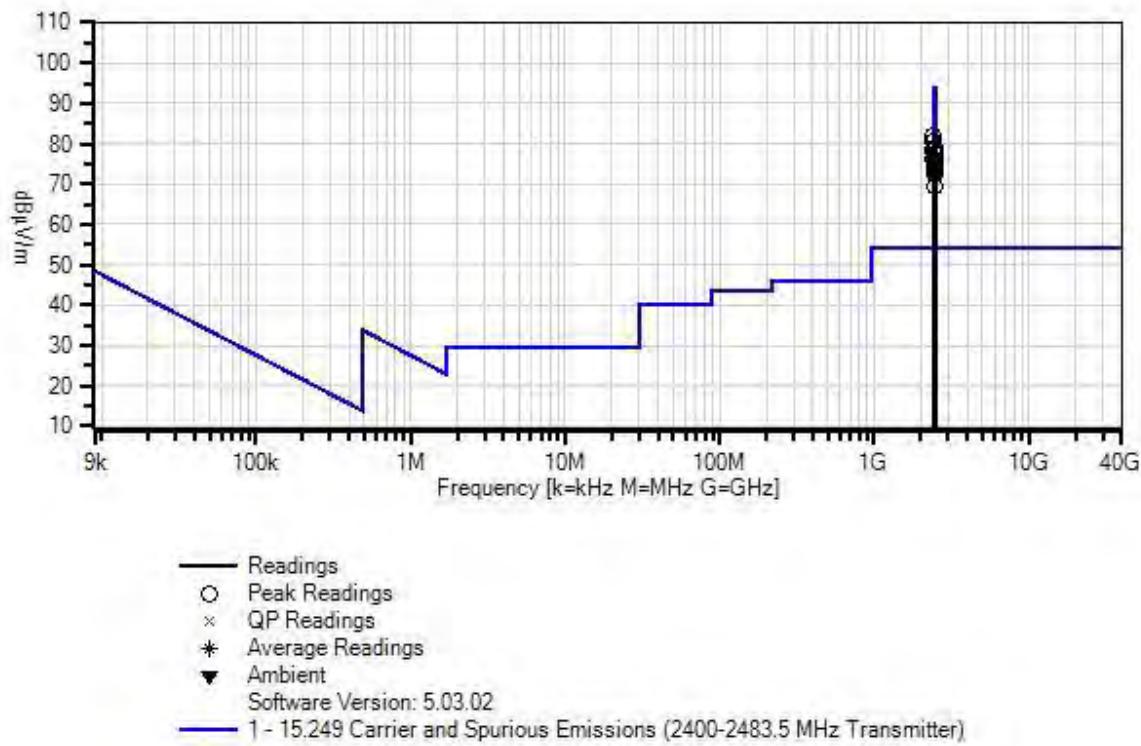
Test Conditions / Notes:

The EUT is placed on a Styrofoam platform at 1.5m height. The EUT is set to transmit continuously at 99% duty cycle. The EUT is powered from 3.2VDC power supply to simulate fresh battery installed. The EUT is tested in three orthogonal axes
 Operating frequency: 2402-2480MHz
 BLE modulation: GFSK

 Tested frequency: 2402MHz, 2440MHz, 2480MHz
 RBW=1MHz, VBW=3MHz

 Temperature: 22°C
 Relative Humidity: 49%
 Test Method: ANSI C63.10 (2013)
 Site A

Navdy WO#: 98680 Sequence#: 0 Date: 5/27/2016
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Horiz



Test Equipment:

ID	Asset	Description	Model	Calibration Date	Cal Due Date
T1	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T2	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T3	ANP06544	Cable	32026-29094K- 29094K-36TC	11/2/2015	11/2/2017
T4	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T5	AN02672	Spectrum Analyzer	E4446A	9/30/2015	9/30/2017

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	2402.033M	90.5 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 82.1	82.1 94.0	94.0 -11.9	Vert Z axis	
2	2402.033M	90.3 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 81.9	81.9 94.0	94.0 -12.1	Horiz Y axis	
3	2402.033M	88.9 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 80.5	80.5 94.0	94.0 -13.5	Horiz X axis	
4	2440.078M	87.4 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 79.0	79.0 94.0	94.0 -15.0	Vert X axis	
5	2440.078M	87.0 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 78.6	78.6 94.0	94.0 -15.4	Vert Z axis	
6	2402.033M	86.9 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 78.5	78.5 94.0	94.0 -15.5	Horiz Z axis	
7	2402.033M	86.7 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 78.3	78.3 94.0	94.0 -15.7	Vert Y axis	
8	2440.078M	85.9 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 77.5	77.5 94.0	94.0 -16.5	Horiz Y axis	
9	2402.033M	84.7 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 76.3	76.3 94.0	94.0 -17.7	Vert X axis	
10	2440.078M	84.4 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 76.0	76.0 94.0	94.0 -18.0	Vert Y axis	
11	2480.100M	84.1 +0.0	-38.0 +25.1	+25.1 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 75.9	75.9 94.0	94.0 -18.1	Vert Z axis	
12	2480.100M	82.8 +0.0	-38.0 +25.1	+25.1 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 74.6	74.6 94.0	94.0 -19.4	Vert Y axis	
13	2480.100M	82.3 +0.0	-38.0 +25.1	+25.1 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 74.1	74.1 94.0	94.0 -19.9	Vert X axis	
14	2440.078M	82.0 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 73.6	73.6 94.0	94.0 -20.4	Horiz X axis	
15	2440.078M	81.6 +0.0	-38.1 +25.0	+25.0 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 73.2	73.2 94.0	94.0 -20.8	Horiz Z axis	
16	2480.100M	81.0 +0.0	-38.0 +25.1	+25.1 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 72.8	72.8 94.0	94.0 -21.2	Horiz Z axis	
17	2480.100M	80.6 +0.0	-38.0 +25.1	+25.1 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 72.4	72.4 94.0	94.0 -21.6	Horiz Y axis	
18	2480.100M	77.8 +0.0	-38.0 +25.1	+25.1 +0.7	+0.7 +4.0	+4.0 +0.0	+0.0 69.6	69.6 94.0	94.0 -24.4	Horiz X axis	

Test Setup Photo(s)





X Axis



Y Axis



Z Axis

15.249(a) Radiated Emissions

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112
 Customer: **Navdy**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: **98680** Date: 5/31/2016
 Test Type: **Maximized Emissions** Time: 15:31:15
 Tested by: Don Nguyen Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on a Styrofoam platform at 1.5m height. The EUT is set to transmit continuously at 99% duty cycle. The EUT is powered from 3.2VDC power supply to simulate fresh battery installed. The EUT is tested in three orthogonal axes. Data represents worst case emissions.

Operating frequency: 2402-2480MHz

Tested frequency: 2402MHz, 2440MHz, 2480MHz

BLE modulation: GFSK

Frequency range of measurement = 9kHz-25000MHz
 0.009MHz to 0.15MHz RBW=0.2kHz, VBW=0.6kHz.
 0.15MHz to 30MHz RBW=9kHz, VBW=27kHz.
 30MHz to 1000MHz RBW=120kHz, VBW=360kHz.
 1000MHz to 25000MHz RBW=1MHz, VBW=3MHz.

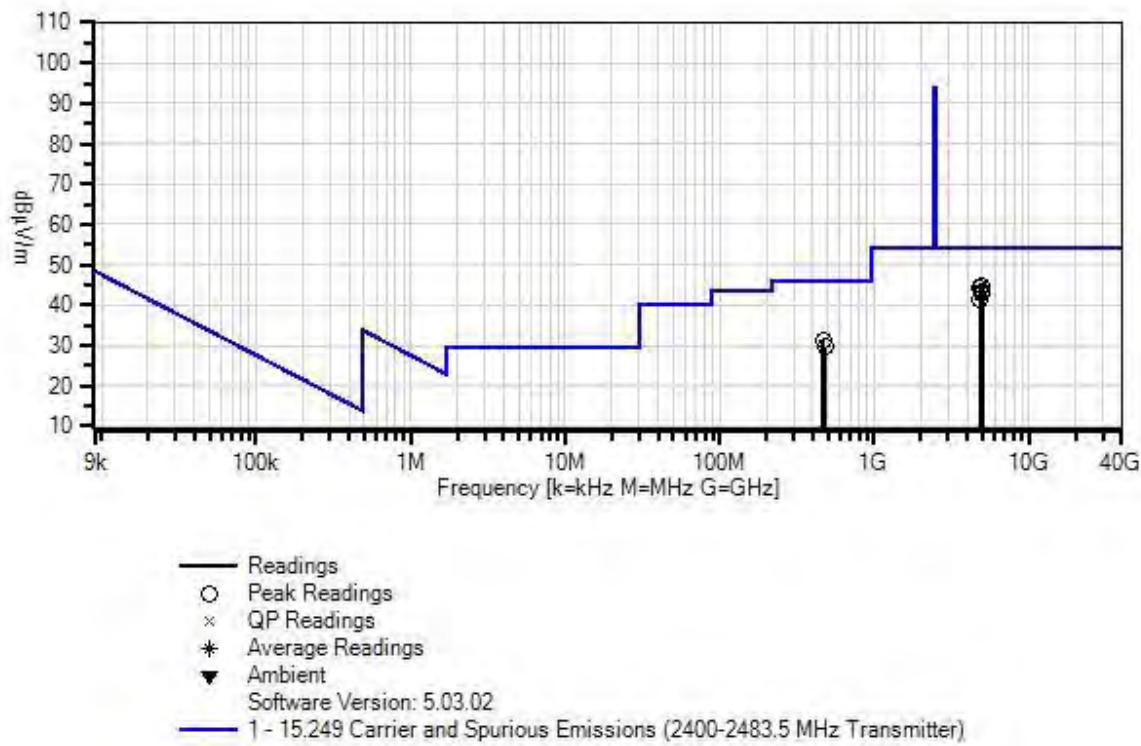
Temperature: 19°C

Relative Humidity 51%

Test Method: ANSI C63.10 (2013)

Site A

Navdy WO#: 98680 Sequence#: 1 Date: 5/31/2016
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Horiz



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01413	Horn Antenna	84125-80008	11/25/2014	11/25/2016
	AN00314	Loop Antenna	6502	5/20/2016	5/20/2018
T1	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T2	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T3	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
T4	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/15/2015	6/15/2017
T5	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T6	AN02672	Spectrum Analyzer	E4446A	9/30/2015	9/30/2017
T7	AN00309	Preamp	8447D	3/14/2016	3/14/2018
T8	AN01995	Biconilog Antenna	CBL6111C	5/10/2016	5/10/2018
T9	ANP05275	Attenuator	1W	5/5/2016	5/5/2018
T10	ANP05050	Cable	RG223/U	1/15/2015	1/15/2017
T11	ANP05198	Cable-Amplitude 15 to 45degC (dB)	8268	12/22/2014	12/22/2016

Measurement Data: Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
			T9	T10	T11		Table	dB μ V/m	dB μ V/m		
			MHz	dB μ V	dB	dB	dB				
1	4958.000M	45.3	-37.6	+29.9	+1.0	+0.1	+0.0	44.6	54.0	-9.4	Vert
			+5.9	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
2	4804.000M	45.6	-37.6	+29.6	+1.0	+0.1	+0.0	44.5	54.0	-9.5	Horiz
			+5.8	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
3	4882.250M	44.0	-37.7	+29.8	+1.0	+0.1	+0.0	43.1	54.0	-10.9	Horiz
			+5.9	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
4	4958.250M	43.6	-37.6	+29.9	+1.0	+0.1	+0.0	42.9	54.0	-11.1	Horiz
			+5.9	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
5	4882.250M	43.8	-37.7	+29.8	+1.0	+0.1	+0.0	42.9	54.0	-11.1	Vert
			+5.9	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
6	4804.250M	42.4	-37.6	+29.6	+1.0	+0.1	+0.0	41.3	54.0	-12.7	Vert
			+5.8	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
7	467.310M	31.8	+0.0	+0.0	+0.0	+0.0	+0.0	31.4	46.0	-14.6	Horiz
			+0.0	+0.0	-27.9	+17.4					
			+6.0	+0.3	+3.8						
8	478.160M	29.6	+0.0	+0.0	+0.0	+0.0	+0.0	29.6	46.0	-16.4	Vert
			+0.0	+0.0	-27.8	+17.6					
			+6.0	+0.3	+3.9						

Band Edge

Band Edge Summary

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2400	GFSK	Integral	51.4	<54	Pass
2483.5	GFSK	Integral	43.0	<54	Pass

Band Edge Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 7149936112
 Customer: Navdy
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: TBD Date: 5/27/2016
 Test Type: **Maximized Emissions** Time: 14:16:12
 Tested By: Don Nguyen Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

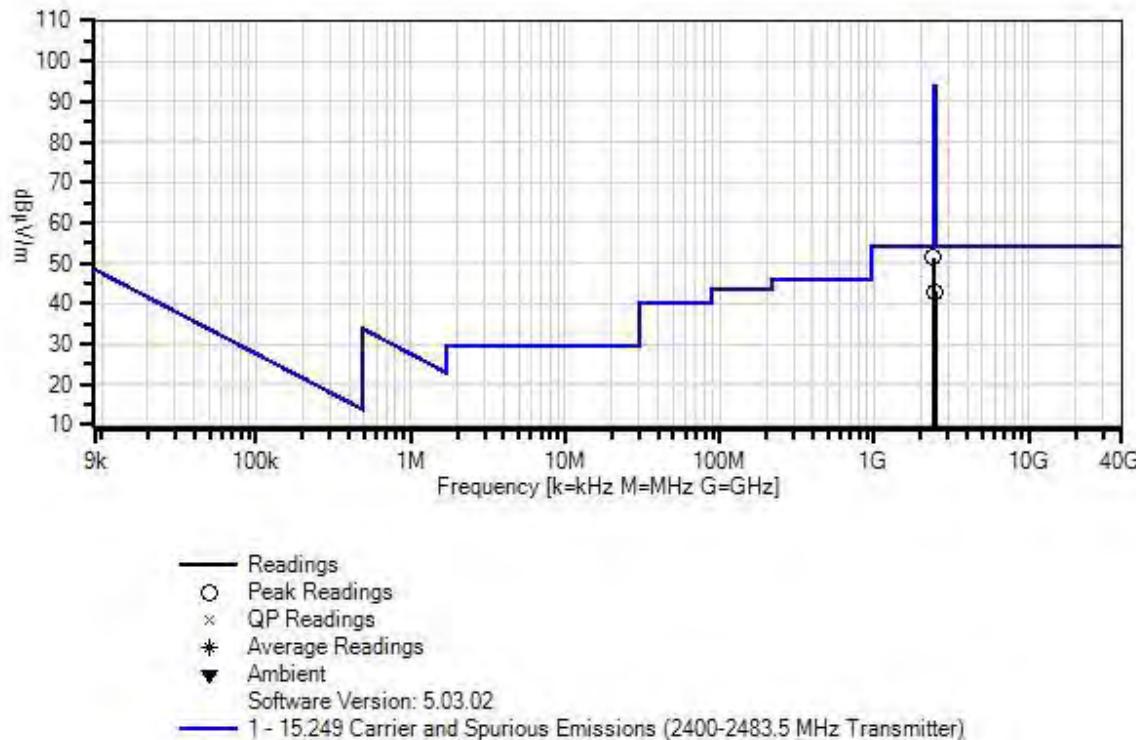
Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on a Styrofoam platform at 1.5m height. The EUT is set to transmit continuously at 99% duty cycle. The EUT is powered from 3.2Vdc power supply to simulate fresh battery installed. The EUT is tested in three orthogonal axes
 Operating frequency: 2402-2480MHz
 BLE modulation: GFSK

 Tested frequency: 2402MHz, 2480MHz
 RBW=1MHz, VBW=3MHz;

 Temperature: 22°C
 Relative Humidity: 49%
 Test Method: ANSI C63.10 (2013)
 Site A

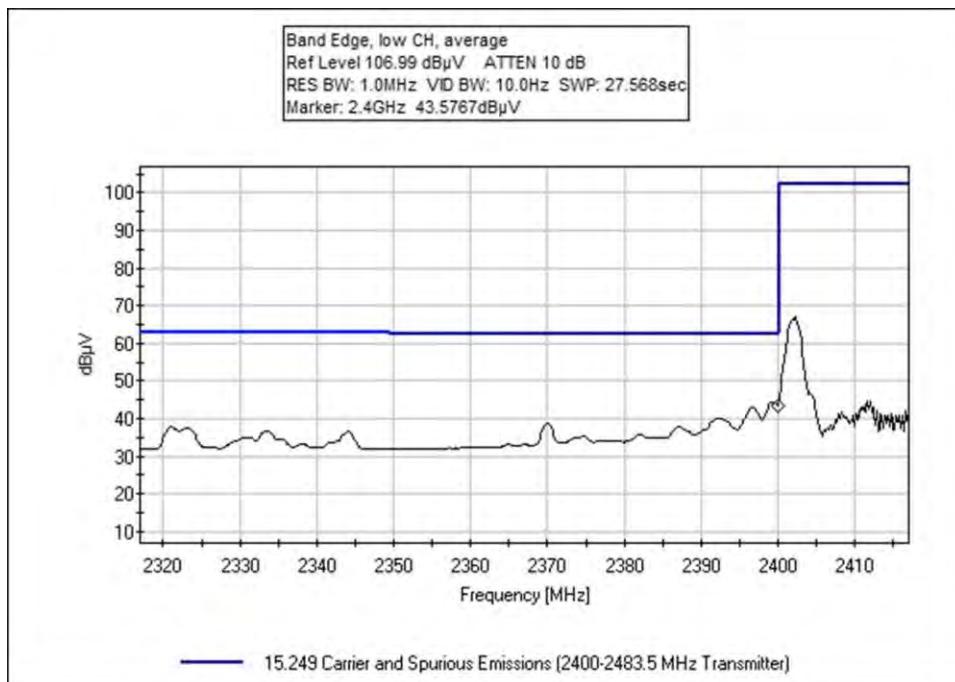
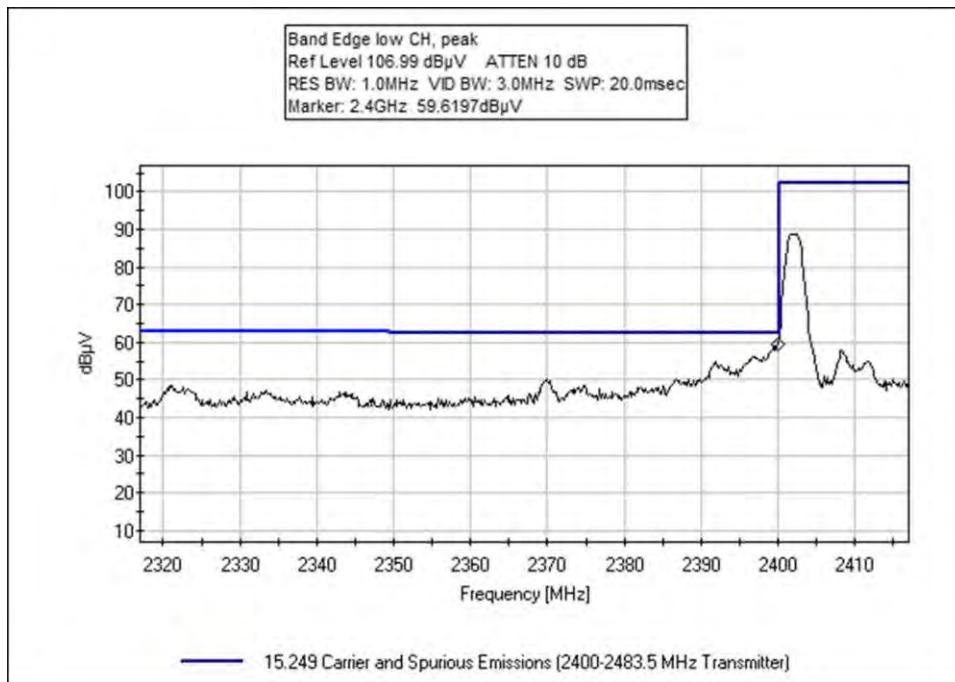
Navdy WO#: TBD Sequence#: 1 Date: 5/27/2016
 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Horiz

Test Equipment:

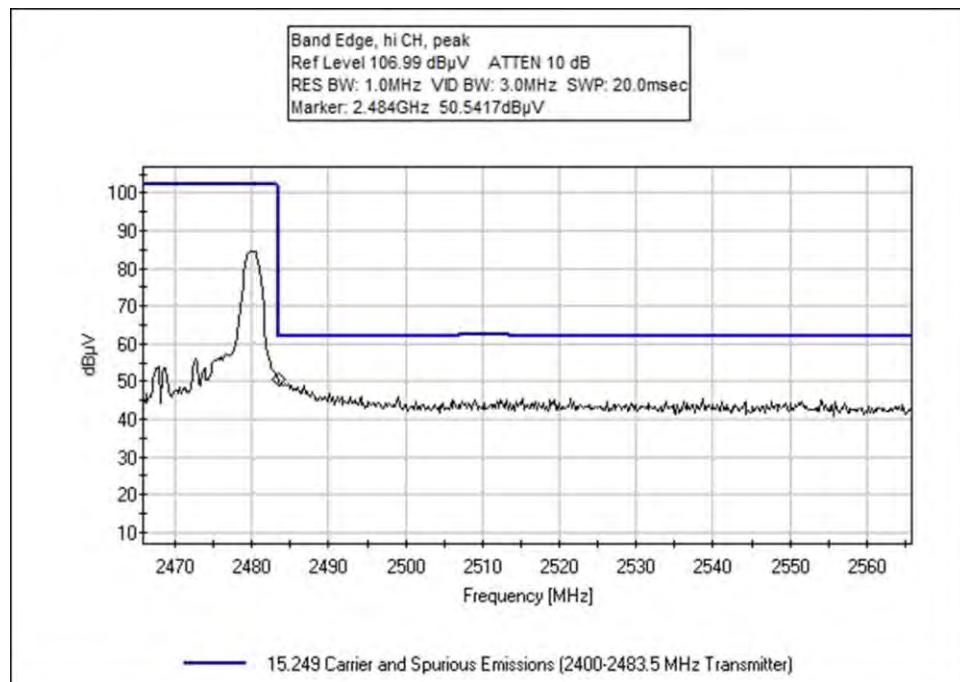
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T2	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T3	ANP06544	Cable	32026-29094K- 29094K-36TC	11/2/2015	11/2/2017
T4	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T5	AN02672	Spectrum Analyzer	E4446A	9/30/2015	9/30/2017

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

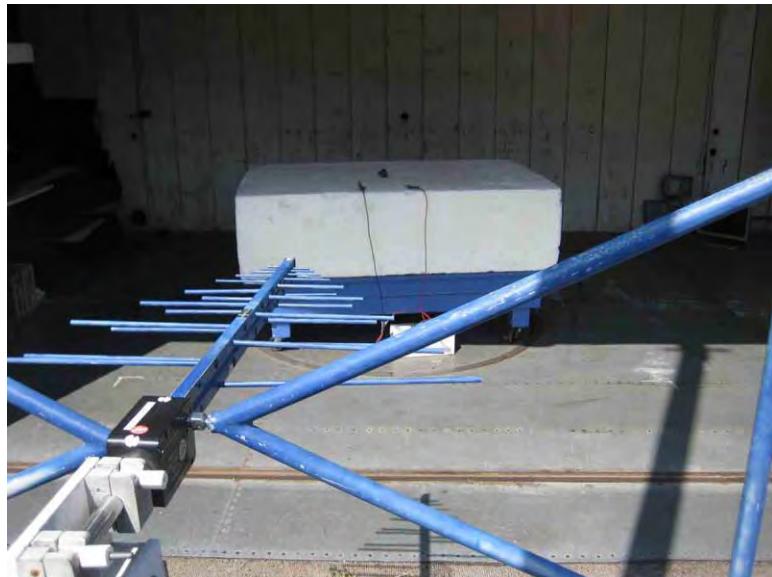
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2400.000M	59.8	-38.1	+25.0	+0.7	+4.0	+0.0	51.4	54.0	-2.6	Vert
		+0.0									
2	2483.500M	51.2	-38.0	+25.1	+0.7	+4.0	+0.0	43.0	54.0	-11.0	Vert
		+0.0									

Band Edge Plots





Test Setup Photo(s)







X Axis



Y Axis



Z Axis

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

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

Emissions Test Details

TESTING PARAMETERS

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

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

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

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on 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	($\text{dB}\mu\text{V}$)
+ Antenna Factor	(dB/m)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

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

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

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

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

Peak

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

Quasi-Peak

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

Average

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