# Enlighted, Inc.

**TEST REPORT FOR** 

BLE Smart Sensor / BLE Ruggedized Sensor Model: SU-4S-H

**Tested To The Following Standards:** 

FCC Part 15 Subpart C Sections:

15.207 & 15.247 (DTS 2400-2483.5 MHz)

Report No.: 98231-11

Date of issue: May 25, 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.

This report contains a total of 143 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc.



#### 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	5
General Product Information	6
FCC Part 15 Subpart C	7
15.247(a)(2) 6dB Bandwidth	7
15.247(b)(3) Output Power	12
15.247(e) Power Spectral Density	29
15.247(d) RF Conducted Emissions & Band Edge	38
15.247(d) Radiated Emissions & Band Edge	63
15.207 AC Conducted Emissions	129
Supplemental Information	142
Measurement Uncertainty	142
Emissions Test Details	142



# **ADMINISTRATIVE INFORMATION**

# **Test Report Information**

#### **REPORT PREPARED FOR:**

Enlighted, Inc. 930 Benecia Ave Sunnyvale, CA 94085 **REPORT PREPARED BY:** 

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

REPRESENTATIVE: Deepak Kumar Customer Reference Number: PO0003249

DATE OF EQUIPMENT RECEIPT: DATE(S) OF TESTING: Project Number: 98231

April 25, 2016 April 25 – May 12, 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 7 B

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



# **Test Facility Information**



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

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

## **Software Versions**

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

## Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	A-0149



## SUMMARY OF RESULTS

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

# **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
Nana	

None

# **EQUIPMENT UNDER TEST (EUT)**

The following model has been tested by CKC Laboratories: SU-4S-H

The manufacturer states that the following additional model is identical electrically to the one which was tested, or any difference between them does not affect their EMC characteristics, and therefore they meet the level of testing equivalent to the tested model.

SU-4S-L SU-4S-LRW SU-4S-LRB SU-4S-HRW

SU-4S-HRB



# EQUIPMENT UNDER TEST (EUT) - continued

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
BLE Smart Sensor / BLE	Enlighted, Inc.	SU-4S-H	Unit 1
Ruggedized Sensor			
Support Equipment:			
Device	Manufacturer	Model #	S/N
AC/DC Power Adapter for EUT	Enercell	273-332	NA
Cebal Controller Devices	Texas Instruments	CC Debugger	NA
Laptop	Lenovo	T420	R8-Y5WA3
Configuration 2			
Configuration 2 Equipment Tested:			
Device	Manufacturer	Model #	S/N
BLE Smart Sensor / BLE	Enlighted, Inc.	SU-4S-H	Unit 2
Ruggedized Sensor			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Cebal Controller Devices	Texas Instruments	CC Debugger	NA
AC/DC Power Adapter for EUT	Enercell	273-332	NA
Laptop	Lenovo	T420	R8-Y5WA3

### **General Product Information:**

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	BLE version 4.0 and 802.15.4
Operating Frequency Range:	2402MHz to 2480MHz
Modulation Type(s):	O-QPSK
Maximum Duty Cycle:	100%
Number of TX Chains:	40 for BLE and 16 for 802.15.4
Antenna Type(s) and Gain:	0
Beamforming Type:	NA
Antenna Connection Type:	Integral
Nominal Input Voltage:	12-24VDC
Software used for Test:	PuTTy version 0.64 for 802.15.4
Software used for fest.	Smart RF Studio 7 version 2.1.0 for Bluetooth



# 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), KDB 558074 v03r05 section 8	Test Date(s):	5/2/2016	
Configuration:	Configuration: 1			
Test Setup: The EUT is placed on a non-conducted table. The EUT is connected directly to a Spectrum Analyzer. It is set continuously transmitting as intended.				

Environmental Conditions					
Temperature ( <sup>o</sup> C)	Temperature (°C) 21.3 Relative Humidity (%): 49				

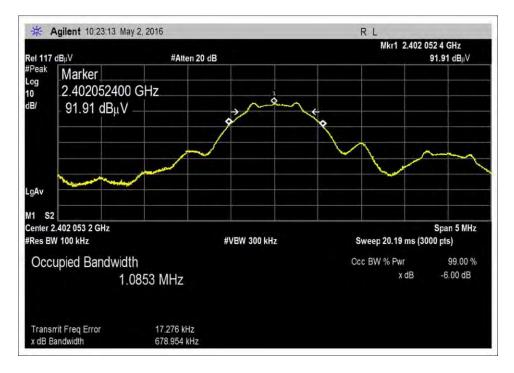
Test Equipment					
Asset# Description Manufacturer Model Cal Date Cal Due					
P06900	Cable	Astrolab	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
P01211	Attenuator	Aeroflex/Weinschel	23-10-34	3/31/2015	3/31/2017
03471	Spectrum Analyzer	Agilent	E4440A	1/4/2016	1/4/2018

	Test Data Summary - BLE					
FrequencyAntennaModulationMeasuredLimit(MHz)PortModulation(kHz)(kHz)					Results	
2402	1	O-QPSK	678.954	≥500	Pass	
2440	1	O-QPSK	683.585	≥500	Pass	
2480	1	O-QPSK	675.766	≥500	Pass	

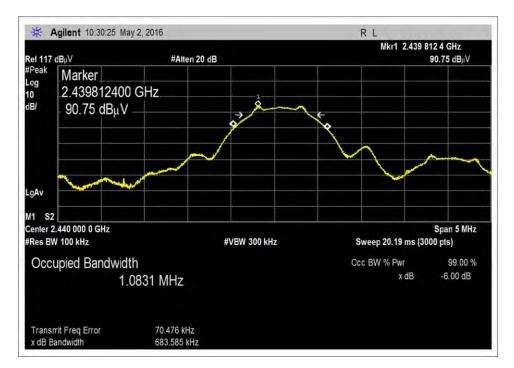
	Test Data Summary – 802.15.4					
FrequencyAntennaModulationMeasuredLimi(MHz)Port(kHz)(kHz)(kHz)					Results	
2405	1	O-QPSK	1168	≥500	Pass	
2440	1	O-QPSK	1167	≥500	Pass	
2480	1	O-QPSK	1171	≥500	Pass	



#### Plots

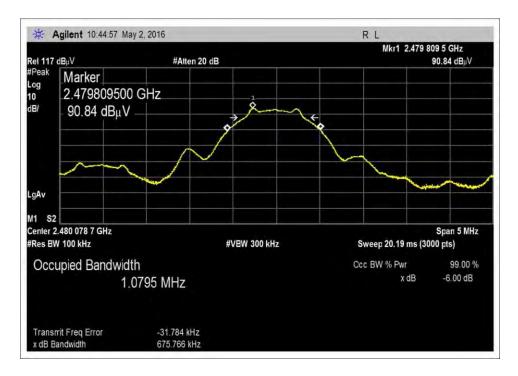


BLE, Low Channel

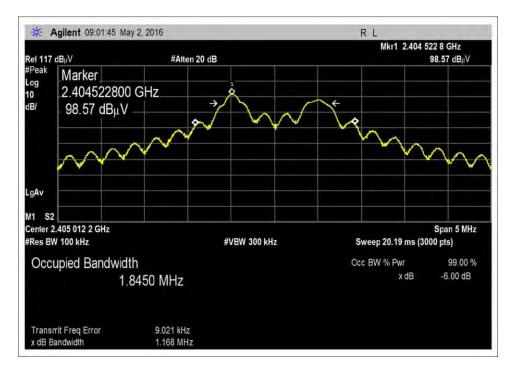


BLE, Middle Channel



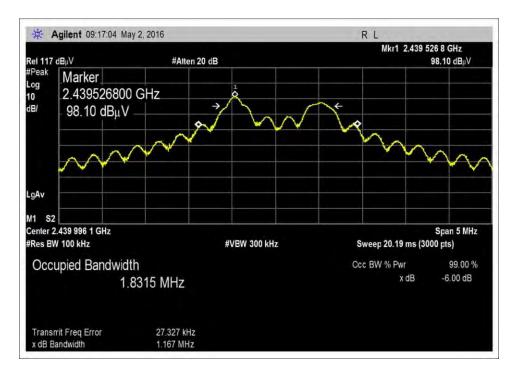


BLE, High Channel

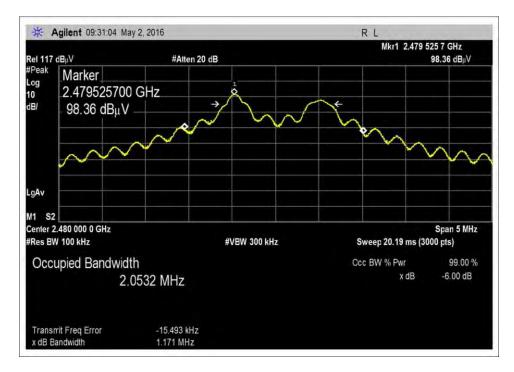


802.15.4, Low Channel





802.15.4, Middle Channel



802.15.4, High Channel



## **Test Setup Photo**





# 15.247(b)(3) Output Power

Test Data Summary – Voltage Variations – BLE – Configuration 1						
Frequency (MHz)	Modulation	V <sub>Minimum</sub> (dBm)	V <sub>Nominal</sub> (dBm)	V <sub>Maximum</sub> (dBm)	Max Deviation from V <sub>Nominal</sub> (dB)	
2402	O-QPSK	-3.51	-3.5	-3.53	0.03	

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

Test Data Summary – Voltage Variations – 802.15.4 – Configuration 1						
Frequency (MHz)	Modulation	V <sub>Minimum</sub> (dBm)	V <sub>Nominal</sub> (dBm)	V <sub>Maximum</sub> (dBm)	Max Deviation from V <sub>Nominal</sub> (dB)	
2405	O-QPSK	3.53	3.5	3.54	0.04	

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

Test Data Summary – Voltage Variations – BLE – Configuration 2						
Frequency (MHz)	Modulation	V <sub>Minimum</sub> (dBm)	V <sub>Nominal</sub> (dBm)	V <sub>Maximum</sub> (dBm)	Max Deviation from V <sub>Nominal</sub> (dB)	
2402	O-QPSK	-4.15	-4.1	-4.09	0.05	

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

Test Data Summary – Voltage Variations – 802.15.4 – Configuration 2						
Frequency (MHz)	Modulation	V <sub>Minimum</sub> (dBm)	V <sub>Nominal</sub> (dBm)	V <sub>Maximum</sub> (dBm)	Max Deviation from V <sub>Nominal</sub> (dB)	
2405	O-QPSK	3.04	3.0	3.03	0.04	

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

#### Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
V <sub>Nominal</sub> :	12-24VDC
V <sub>Minimum</sub> :	10.2VDC
V <sub>Maximum</sub> :	27.6VDC



Test Data Summary – RF Conducted Measurement – BLE – Configuration 1						
Measuremen	Measurement Option: RBW > DTS Bandwidth					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results	
2402	O-QPSK	0	-3.5	≤ 30	Pass	
2440	O-QPSK	0	-4.7	≤ 30	Pass	
2480	O-QPSK	0	-5.1	≤ 30	Pass	

Test	Test Data Summary – RF Conducted Measurement – 802.15.4 – Configuration 1						
Measuremen	t Option: RBW > DTS Ba	ndwidth					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results		
2405	O-QPSK	0	3.5	≤ 30	Pass		
2440	O-QPSK	0	3.1	≤ 30	Pass		
2480	O-QPSK	0	3.3	≤ 30	Pass		

Те	Test Data Summary – RF Conducted Measurement – BLE – Configuration 2						
Measuremen	Measurement Option: RBW > DTS Bandwidth						
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results		
2402	O-QPSK	0	-4.1	≤ 30	Pass		
2440	O-QPSK	0	-5.3	≤ 30	Pass		
2480	O-QPSK	0	-5.9	≤ 30	Pass		

Test Data Summary – RF Conducted Measurement – 802.15.4 – Configuration 2						
Measuremen	t Option: RBW > DTS Ba	ndwidth				
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results	
2405	O-QPSK	0	3	≤ 30	Pass	
2440	O-QPSK	0	2.7	≤ 30	Pass	
2480	O-QPSK	0	2.7	≤ 30	Pass	

For fixed point-to-point antennas, the limit is calculated in accordance with 15.247 $\in$ (1): Limit = 30 - Roundup  $\left(\frac{G-6}{3}\right)$ 

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

P(dBm) = E(dBuV/m) + 20LOG(d) - G - 104.77



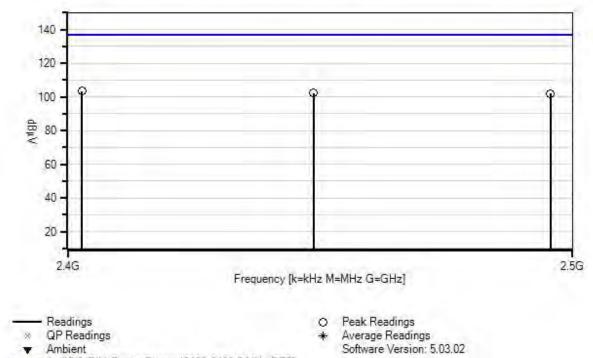
Test Location: Customer:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 Enlighted, Inc.				
Specification:	15.247(b) Power Output (2400-2483.5 MHz	DTS)			
Work Order #:	98231	Date:	5/2/2016		
Test Type:	Conducted Measurement	Time:	10:30:58		
Tested By:	Hieu Song Nguyenpham	Sequence#:	94		
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:			
Fundamental			
Application: PuTTy versio Application: Smart RF Stu		Bluetooth	
Temperature: 21.3°C			
Humidity: 49 %			
Atmospheric Pressure: 101	.4kPa		
High Clock: 16MHz Transmitting operating fre Transmitting operating fre Gain of the antenna for Bh Gain of the antenna for Zig Method: ANSI C63.10 (20 RBW=3MHz VBW=8MHz	quency= 2405, 2440 and uetooth= 0dBi gbee= 0dBi	1 2480MHz for 802.15.4	
The EUT is placed on a transmitting as intended. <b>TX Mode on BLE</b>	non-conducted table.	It is connected to a spec	trum analyzer. It is set continuously
IA MOUE OILDLE			



Enlighted, Inc WD#: 98231 Sequence#: 94 Date: 5/2/2016 15.247(b) Power Output (2400-2483.5 MHz DTS) Test Distance: None None



Readings 8 QP Readings Ambient Ŧ 1 - 15.247(b) Power Output (2400-2483.5 MHz DTS)

ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Meas	Measurement Data:		Reading listed by margin.			Test Distance: None					
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
]	1 2402.305M	93.0	+10.0	+0.5			+0.0	103.5	137.0	-33.5	None
2	2 2440.318M	91.8	+10.0	+0.5			+0.0	102.3	137.0	-34.7	None
3	3 2479.792M	91.4	+10.0	+0.5			+0.0	101.9	137.0	-35.1	None



Test Location: Customer:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 <b>Enlighted, Inc.</b>						
	15.247(b) Power Output (2400-2483.5 MHz	DTS					
Work Order #:	98231	,	5/2/2016				
Test Type:	Conducted Measurement		09:19:18				
Tested By:	Hieu Song Nguyenpham	Sequence#:	92				
Software:	EMITest 5.03.02						

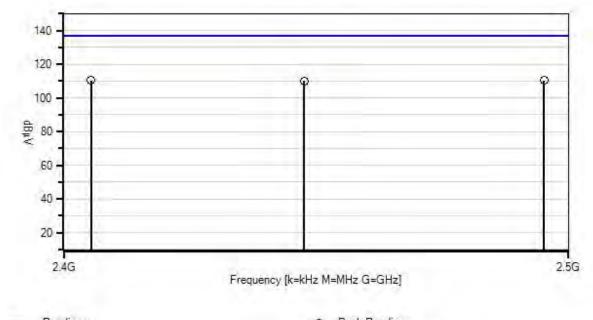
#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Notes	:		
Fundamental			
Application: PuTTy vers	sion 0.64 for 802.15.4		
Application: Smart RF S	tudio 7 version 2.1.0 for B	luetooth	
Temperature: 21.3°C Humidity: 49 % Atmospheric Pressure: 1	01.4kPa		
High Clock: 16MHz			
	requency= $2402$ , $2440$ and $2405$ , $2440$		
Gain of the antenna for I	requency= $2405$ , $2440$ and Bluetooth= $0dBi$	24801VIHZ for 802.15.4	
Gain of the antenna for Z			
	2013) and KDB 558074v0.	3r05 section 9.1	
RBW=3MHz	,		
VBW=8MHz			
The EUT is placed on transmitting as intended.		t is connected to a spo	ectrum analyzer. It is set continuously

#### TX Mode on 802.15.4



Enlighted, Inc WD#: 98231 Sequence#: 92 Date: 5/2/2016 15.247(b) Power Output (2400-2483.5 MHz DTS) Test Distance: None None



Readings 8 QP Readings \* Ambient Ŧ 1 - 15.247(b) Power Output (2400-2483.5 MHz DTS)

O Peak Readings

Average Readings Software Version: 5.03.02

ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06900 Cable		32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Me	Measurement Data:		Re	Reading listed by margin.			Test Distance: None					
#	¥	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
		MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
	1	2404.515M	100.0	+10.0	+0.5			+0.0	110.5	137.0	-26.5	None
	2	2479.368M	99.8	+10.0	+0.5			+0.0	110.3	137.0	-26.7	None
	3	2439.415M	99.6	+10.0	+0.5			+0.0	110.1	137.0	-26.9	None



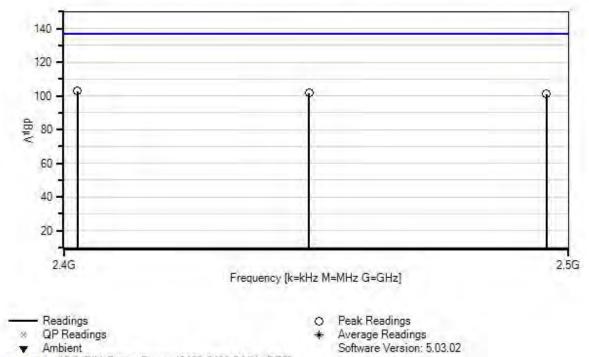
Test Location: Customer:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 <b>Enlighted, Inc.</b>						
Specification:	15.247(b) Power Output (2400-2483.5 MHz	DTS)					
Work Order #:	98231	Date:	5/5/2016				
Test Type:	Conducted Measurement	Time:	11:45:18				
Tested By:	Hieu Song Nguyenpham	Sequence#:	110				
Software:	EMITest 5.03.02						

Equipment Tested:

Equipment Tested:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Test Conditions / Notes:			
Fundamental			
Application: PuTTy version	on 0.64 for 802.15.4		
Application: Smart RF Str	udio 7 version 2.1.0 for B	luetooth	
<b>T 1 1 1 1 1 1 1 1 1 1</b>			
Temperature: 22.1°C			
Humidity: 45 %	0.71.D		
Atmospheric Pressure: 10	0./KPa		
High Clock: 16MHz			
Transmitting operating free	equency= 2402, 2440 and	2480MHz for BLE	
Transmitting operating fre			
Gain of the antenna for Bl	1 0		
Gain of the antenna for Zi	gbee= 0dBi		
Method: ANSI C63.10 (20	013) and KDB 558074v03	3r05 section 9.1	
RBW=3MHz			
VBW=8MHz			
The FUT is aloos it in	non conducted table. It	is composed to a	mun analyzan It is set continue-
transmitting as intended.	non-conducted table. It	is connected to a speci	rum analyzer. It is set continuously
	s that the Main Board of	the Configuration 2 is sir	nilar to the Configuration 1, but it has
different cover.	s that the Main Dourd of	the configuration 2 is sh	linu to the configuration 1, but it has
	power and choosing the	worst case of transmitting	g operating frequency to test Radiated
Spurious Emission only.	1 -6		
TX Mode on BLE			



Enlighted, Inc WD#: 98231 Sequence#: 110 Date: 5/5/2016 15.247(b) Power Output (2400-2483.5 MHz DTS) Test Distance: None None



Ambient Ŧ

1 - 15.247(b) Power Output (2400-2483.5 MHz DTS)

ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Meas	surement Data:	R	Reading listed by margin.			Test Distance: None					
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
	1 2402.280M	92.4	+10.0	+0.5			+0.0	102.9	137.0	-34.1	None
	2 2440.240M	91.2	+10.0	+0.5			+0.0	101.7	137.0	-35.3	None
	3 2479.740M	90.6	+10.0	+0.5			+0.0	101.1	137.0	-35.9	None



Test Location: Customer:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 <b>Enlighted, Inc.</b>						
Specification:	15.247(b) Power Output (2400-2483.5 MHz	DTS)					
Work Order #:	98231	Date:	5/5/2016				
Test Type:	Conducted Measurement	Time:	11:50:31				
Tested By:	Hieu Song Nguyenpham	Sequence#:	111				
Software:	EMITest 5.03.02						

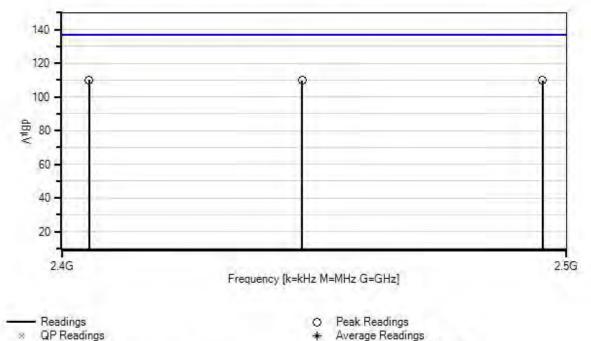
Equipment Tested:

Equipment Tested:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Test Conditions / Note	25:		
Fundamental			
	rsion 0.64 for 802.15.4 Studio 7 version 2.1.0 for B	luetooth	
Temperature: 22.1°C			
Humidity: 45 %			
Atmospheric Pressure:	100.7kPa		
Transmitting operating Gain of the antenna for Gain of the antenna for		2480MHz for 802.15.4	
transmitting as intended The manufacturer decla	d. ares that the Main Board of ring the RF output power an	the Configuration 2 is si	etrum analyzer. It is set continuously imilar to the Configuration 1, but it has e of transmitting operating frequency to

TX Mode on 802.15.4



Enlighted, Inc WD#: 98231 Sequence#: 111 Date: 5/5/2016 15.247(b) Power Output (2400-2483.5 MHz DTS) Test Distance: None None



Ambient Ŧ

1 - 15.247(b) Power Output (2400-2483.5 MHz DTS)

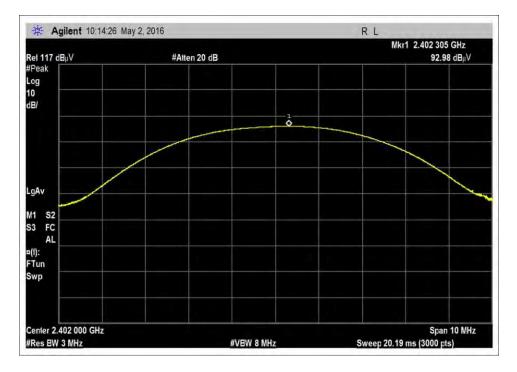
Average Readings Software Version: 5.03.02

ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

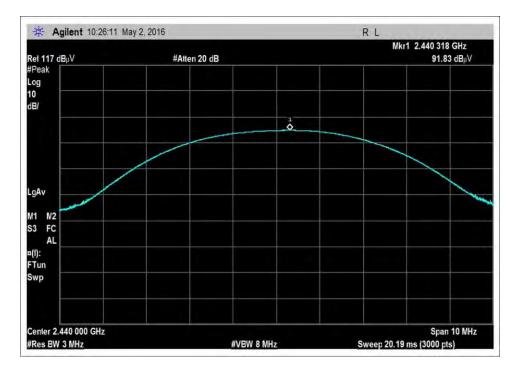
М	Measurement Data:		Reading listed by margin.			Test Distance: None						
	#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
		MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
	1	2404.500M	99.5	+10.0	+0.5			+0.0	110.0	137.0	-27.0	None
	2	2439.440M	99.2	+10.0	+0.5			+0.0	109.7	137.0	-27.3	None
	3	2479.460M	99.2	+10.0	+0.5			+0.0	109.7	137.0	-27.3	None



#### Plots

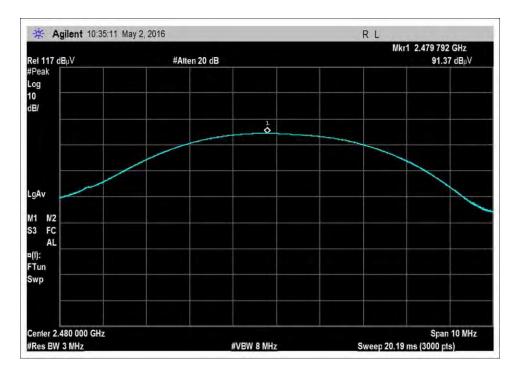


#### Configuration 1, BLE, Low Channel

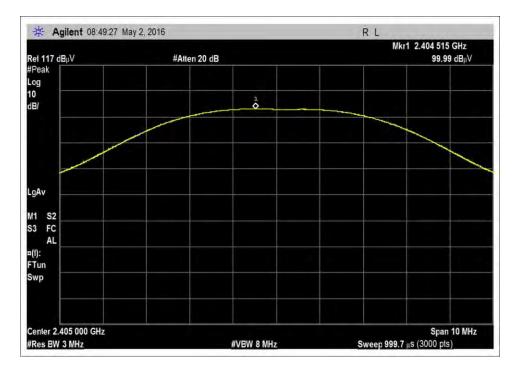


Configuration 1, BLE, Middle Channel



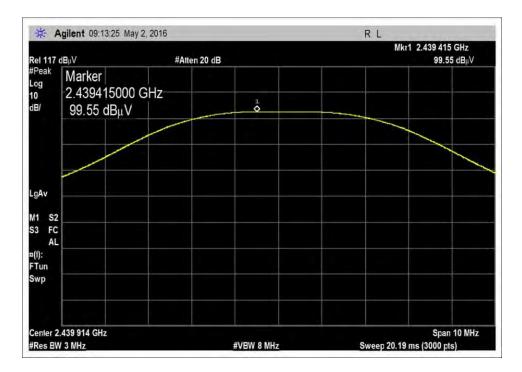


Configuration 1, BLE, High Channel

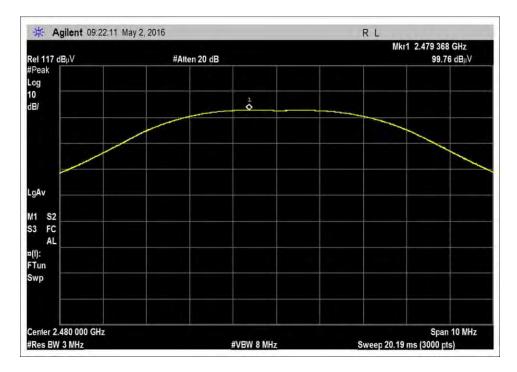


Configuration 1, 802.15.4, Low Channel



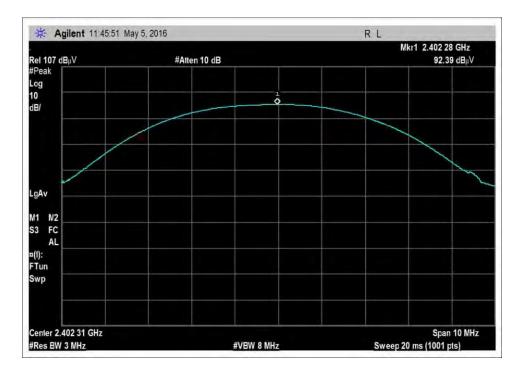


Configuration 1, 802.15.4, Middle Channel

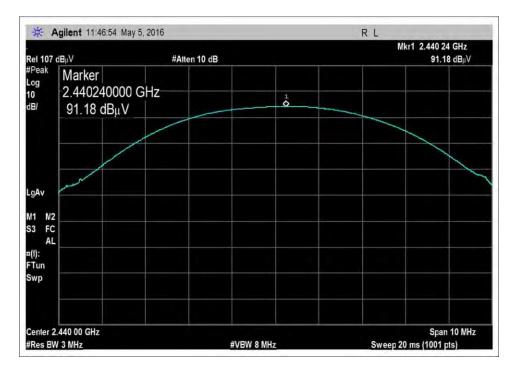


Configuration 1, 802.15.4, High Channel



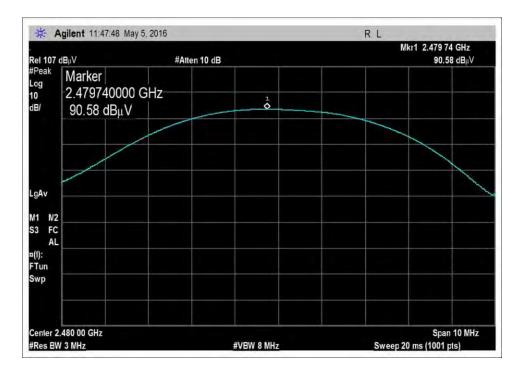


Configuration 2, BLE, Low Channel

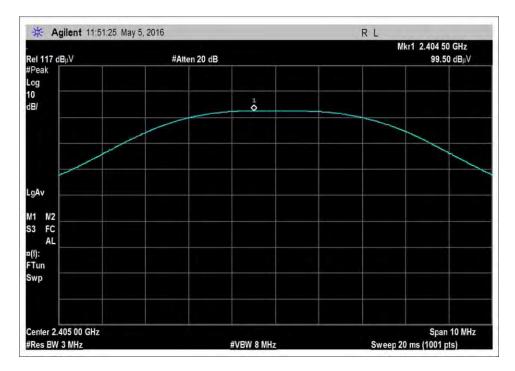


Configuration 2, BLE, Middle Channel



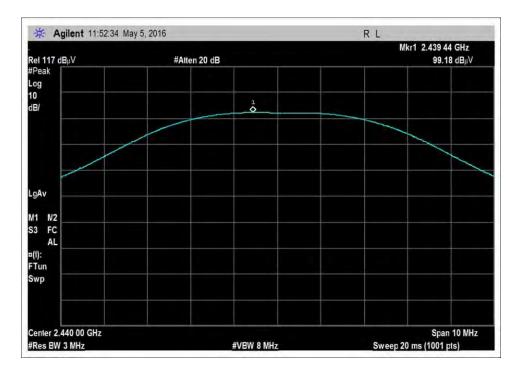


Configuration 2, BLE, High Channel

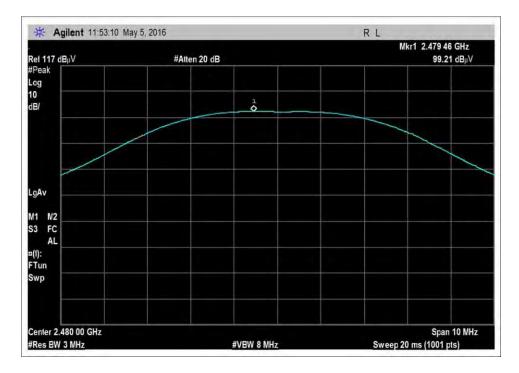


Configuration 2, 802.15.4, Low Channel





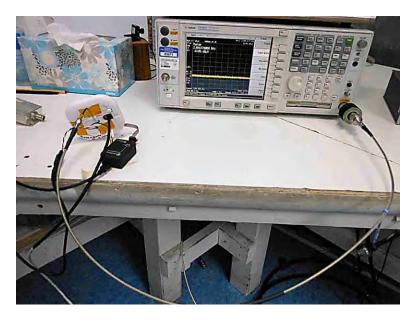
Configuration 2, 802.15.4, Middle Channel



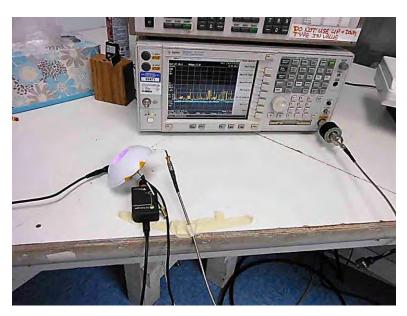
Configuration 2, 802.15.4, High Channel



## Test Setup Photos



Configuration 1



Configuration 2



# 15.247(e) Power Spectral Density

Test Data Summary – RF Conducted Measurement - BLE										
Measurement Method: PKPSD										
Frequency (MHz) Modulation		Measured (dBm/3kHz)	Limit (dBm/3kHz)	Results						
2402	O-QPSK	-17.1	≤8	Pass						
2440	O-QPSK	-17.7	≤8	Pass						
2480	O-QPSK	-18.4	≤8	Pass						

	Test Data Summary – RF Conducted Measurement – 802.15.4										
Measurement Method: PKPSD											
Frequency (MHz)	Modulation	Measured (dBm/3kHz)	Limit (dBm/3kHz)	Results							
2405	O-QPSK	-2.5	≤8	Pass							
2440	O-QPSK	-3	≤8	Pass							
2480	O-QPSK	-2.7	≤8	Pass							

Conducted RF output power calculated in accordance with ANSI C63.10.

$$P(W) = \frac{(E \cdot d)^2}{30 \, G}$$

Or equivalently, in logarithmic form:

P(dBm) = E(dBuV/m) + 20LOG(d) - G - 104.77

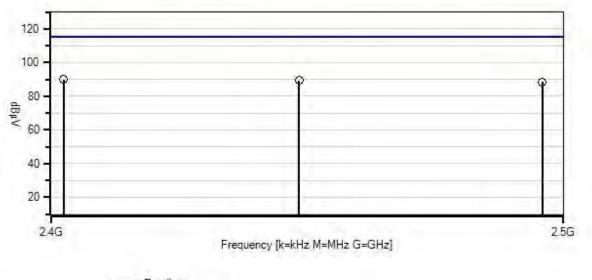


## Test Setup / Conditions / Data

Test Location: Customer: Specification: Work Order #: Test Type: Tested By: Software:	CKC Laboratories, Inc. 1120 Fulton Place Fremont, CA 94539 (510) 249-1170   Enlighted, Inc. 15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS) 98231 Date: 5/2/2016   Conducted Measurement Time: 10:35:03 10:35:03   Hieu Song Nguyenpham Sequence#: 95   EMITest 5.03.02 EMITest 5.03.02									
Equipment Test										
<b>Device</b> Configuration 1	Manufacturer	Model #	S/N							
Support Equipm Device	ent: Manufacturer	Model #	S/N							
Configuration 1		Widden //	D/11							
Test Conditions	/ Notes:									
Power Spectral D	ensity									
Application: Sma Temperature: 21 Humidity: 49 % Atmospheric Pres High Clock: 16M Transmitting oper	Application: PuTTy version 0.64 for 802.15.4 Application: Smart RF Studio 7 version 2.1.0 for Bluetooth Temperature: 21.3°C Humidity: 49 % Atmospheric Pressure: 101.4kPa High Clock: 16MHz Transmitting operating frequency= 2402, 2440 and 2480MHz for BLE Transmitting operating frequency= 2405, 2440 and 2480MHz for 802.15.4									
	na for Zigbee= 0dBi 63.10 (2013) and KDB 558074v0	3r05 section 10.2								
RBW=3kHz VBW=10kHz										
	The EUT is placed on a non-conducted table. It is connected to a spectrum analyzer. It is set continuously transmitting as intended.									
TX Mode on BL	E									



Enlighted, Inc WO#: 98231 Sequence#: 95 Date: 5/2/2016 15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS) Test Distance: None None



O Peak Readings

× QP Readings

\* Average Readings

Ambient

Software Version: 5.03.02

1 - 15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)

ID	Asset # Description		Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measurement Data:		Reading listed by margin.			Test Distance: None						
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	1 2402.040M	79.4	+10.0	+0.5			+0.0	89.9	115.0	-25.1	None
2	2 2440.060M	78.8	+10.0	+0.5			+0.0	89.3	115.0	-25.7	None
	3 2479.956M	78.1	+10.0	+0.5			+0.0	88.6	115.0	-26.4	None



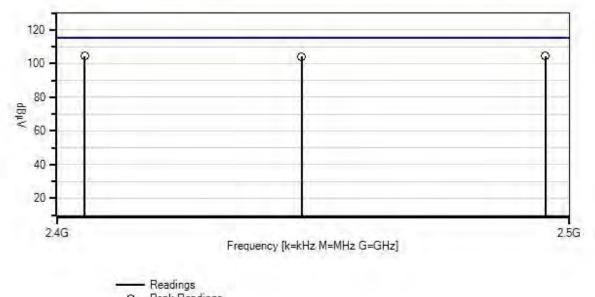
Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170								
Customer:	Enlighted, Inc.								
Specification:	15.247(e) Peak Power Spectral I	Density (2400-2483.5 MH	lz DTS)						
Work Order #:	98231	Date:	5/2/2016						
Test Type:	Conducted Measurement	Time:	09:22:10						
Tested By:	Hieu Song Nguyenpham	Sequence#:	93						
Software:	EMITest 5.03.02								

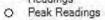
#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Note	s:		
Power Spectral Density			
Application: PuTTy ver Application: Smart RF S	sion 0.64 for 802.15.4 Studio 7 version 2.1.0 for B	luetooth	
Temperature: 21.3°C			
Humidity: 49 %			
Atmospheric Pressure:	101.4kPa		
High Clock: 16MHz			
	frequency= 2402, 2440 and frequency= 2405, 2440 and		
Gain of the antenna for	1 1	24601v1112 101 602.13.4	
Gain of the antenna for			
Method: ANSI C63.10	(2013) and KDB 558074v0	3r05 section 10.2	
RBW=3kHz VBW=10kHz			
The EUT is placed or transmitting as intended		It is connected to a spe	ectrum analyzer. It is set continuously
TX Mode on 802.15.4			



Enlighted, Inc WO#: 98231 Sequence#: 93 Date: 5/2/2016 15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS) Test Distance: None None





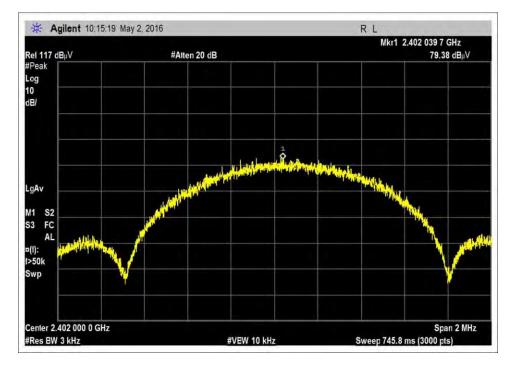
- QP Readings ×
- Average Readings
- Ambient
  - Software Version: 5.03.02
  - 1 15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)

ID	Asset # Description		Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

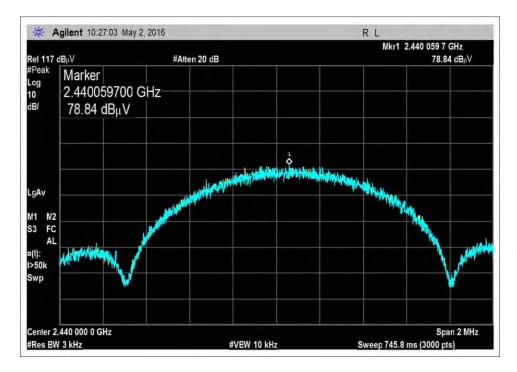
Meas	surement Data:	R	eading lis	ted by ma	argin.		Te	st Distance	e: None		
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
	1 2404.523M	94.0	+10.0	+0.5			+0.0	104.5	115.0	-10.5	None
:	2 2479.524M	93.8	+10.0	+0.5			+0.0	104.3	115.0	-10.7	None
	3 2439.523M	93.5	+10.0	+0.5			+0.0	104.0	115.0	-11.0	None



#### Plots

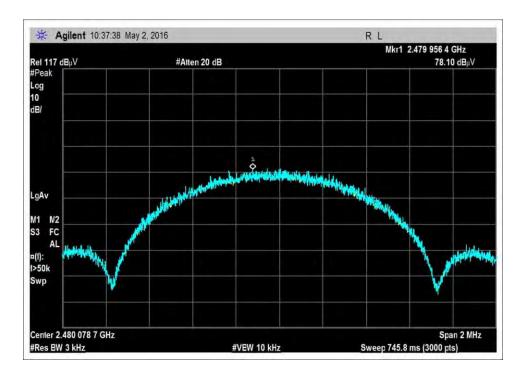


#### BLE, Low Channel

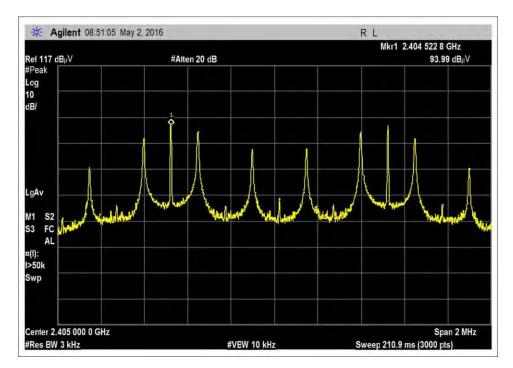


BLE, Middle Channel



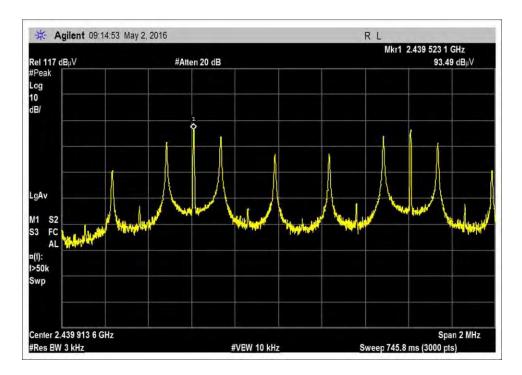


BLE, High Channel

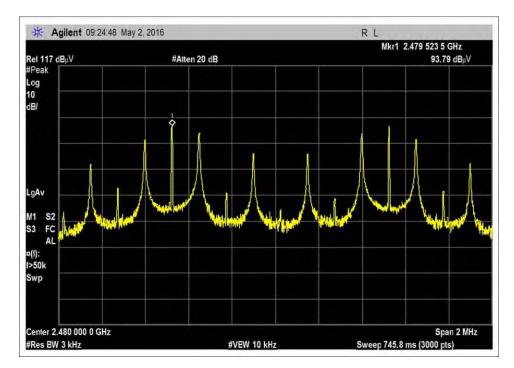


802.15.4, Low Channel





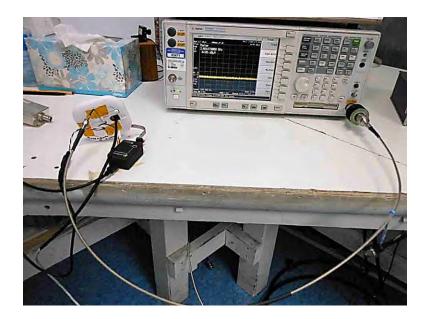
802.15.4, Middle Channel



802.15.4, High Channel



## Test Setup Photo





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

## Limit Line for Spurious Conducted Emission - BLE

The Reference level measurement for Emission is non restricted frequency bands were made using the methods set out in KDB "558074 D01 DTS Meas Guidance v03r05", Section 11 Emissions in non-restricted frequency band. NOTE: The Reference Level is the limit line for Conducted Spurious Emission for Non-Restricted Frequency Band

Reference Limit in 100kHz						
Channel						
Channer	dBuV in 100kHz	Reference Limit dBuV				
Low	103.10	83.10				
Middle	101.86	81.86				
High	101.32	81.32				

Choose the worst reference limit for all the channels.

## Limit Line for Spurious Conducted Emission – 802.15.4

The Reference level measurement for Emission is non restricted frequency bands were made using the methods set out in KDB "558074 D01 DTS Meas Guidance v03r05", Section 11 Emissions in non-restricted frequency band. NOTE: The Reference Level is the limit line for Conducted Spurious Emission for Non-Restricted Frequency Band

Reference Limit in 100kHz						
Channel						
Channer	dBuV in 100kHz	Reference Limit dBuV				
Low	109.07	89.07				
Middle	108.61	88.61				
High	108.81	88.81				

Choose the worst reference limit for all the channels.



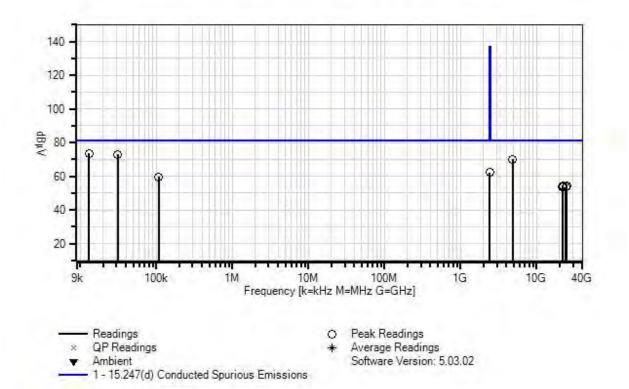
# Test Setup / Conditions / Data

Test Location: Customer: Specification: Work Order #: Test Type: Tested By: Software:	CKC Laboratories, Inc. • 1120 F Enlighted, Inc. 15.247(d) Conducted Spurious J 98231 Conducted Measurement Hieu Song Nguyenpham EMITest 5.03.02	Emissions D	ate: 5/2/2016 me: 11:23:22 AM	170			
Equipment Test							
<b>Device</b> Configuration 1	Manufacturer	Model #	S/N				
Support Equip	nent						
Device	Manufacturer	Model #	S/N				
Configuration 1							
Test Conditions / Notes:   Conducted Spurious Emission Frequency Range: 9kHz to 25000MHz   Application: PuTTy version 0.64 for 802.15.4 Application: Smart RF Studio 7 version 2.1.0 for Bluetooth   Temperature: 21.3°C Humidity: 49 %   Atmospheric Pressure: 101.4kPa High Clock: 16MHz   Transmitting operating frequency= 2402, 2440 and 2480MHz for BLE Transmitting operating frequency= 2405, 2440 and 2480MHz for 802.15.4   Gain of the antenna for Bluetooth= 0dBi Gain of the antenna for Zigbee= 0dBi   Method: ANSI C63.10 (2013) and KDB 558074v03r05 section 11							
RBW=100kHz VBW=300kHz							
The EUT is pla transmitting as in	nced on a non-conducted table. It ntended.	is connected to a sp	bectrum analyzer. It is set o	continuously			
Low Channel or	n TV Mada an DI E						

Low Channel on TX Mode on BLE



Enlighted, Inc WO#: 98231 Sequence#: 98 Date: 5/2/2016 15.247(d) Conducted Spurious Emissions Test Distance: None None





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
T2	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Measu	rement Data:	Re	eading lis	ted by ma	argin.		Те	st Distance	e: None		
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	13.199k	63.8	+0.0	+9.8			+0.0	73.6	81.3	-7.7	None
2	31.444k	63.3	+0.0	+9.8			+0.0	73.1	81.3	-8.2	None
3	4804.480M	59.4	+0.8	+9.9			+0.0	70.1	81.3	-11.2	None
4	2397.773M	51.7	+0.5	+9.9			+0.0	62.1	81.3	-19.2	None
5	107.489k	49.7	+0.0	+9.8			+0.0	59.5	81.3	-21.8	None
6	24842.814 M	42.4	+1.8	+10.0			+0.0	54.2	81.3	-27.1	None
7	21971.556 M	42.4	+1.7	+10.0			+0.0	54.1	81.3	-27.2	None
8	21898.203 M	42.2	+1.7	+10.0			+0.0	53.9	81.3	-27.4	None
9	21751.496 M	42.0	+1.7	+10.0			+0.0	53.7	81.3	-27.6	None
10	24025.449 M	41.5	+1.9	+10.1			+0.0	53.5	81.3	-27.8	None

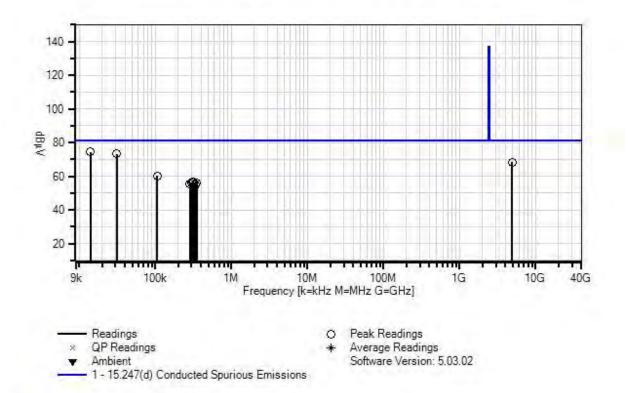


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place	• Fremont, C	A 94539 • (510) 249-1170
Customer:	Enlighted, Inc.		
Specification:	15.247(d) Conducted Spurious Emissions		
Work Order #:	98231	Date:	5/2/2016
Test Type:	Conducted Measurement	Time:	11:16:22 AM
Tested By:	Hieu Song Nguyenpham	Sequence#:	97
Software:	EMITest 5.03.02		

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Note	es:		
Conducted Spurious Er	nission		
Frequency Range: 9kH	z to 25000MHz		
	rsion 0.64 for 802.15.4	<b>N 1 1</b>	
Application: Smart RF	Studio 7 version 2.1.0 for B	luetooth	
Temperature: 21.3°C			
Humidity: 49 %			
Atmospheric Pressure:	101.4kPa		
1			
High Clock: 16MHz			
0 1 0	frequency= 2402, 2440 and		
Gain of the antenna for	frequency= $2405$ , $2440$ and Division of $D_{1}^{1}$	2480MHz for 802.15.4	
Gain of the antenna for			
	(2013) and KDB 558074v0	3r05 section 11	
	(2015) und RDD 55007 100		
RBW=100kHz			
VBW=300kHz			
1		It is connected to a spe	ctrum analyzer. It is set continuously
transmitting as intended	1.		
Middle Channel on T	X Mode on BLE		
	A MOUT ON DLE		



Enlighted, Inc WO#: 98231 Sequence#: 97 Date: 5/2/2016 15.247(d) Conducted Spurious Emissions Test Distance: None None





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
T2	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Measu	rement Data:	Re	eading lis	ted by ma	argin.		Те	st Distance	e: None		
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	14.101k	64.5	+0.0	+9.8			+0.0	74.3	81.3	-7.0	None
2	31.444k	63.5	+0.0	+9.8			+0.0	73.3	81.3	-8.0	None
3	4876.606M	57.6	+0.8	+9.9			+0.0	68.3	81.3	-13.0	None
4	106.707k	50.4	+0.0	+9.8			+0.0	60.2	81.3	-21.1	None
5	310.586k	47.0	+0.0	+9.8			+0.0	56.8	81.3	-24.5	None
6	323.622k	46.7	+0.0	+9.8			+0.0	56.5	81.3	-24.8	None
7	297.551k	46.4	+0.0	+9.8			+0.0	56.2	81.3	-25.1	None
8	349.694k	46.3	+0.0	+9.8			+0.0	56.1	81.3	-25.2	None
9	284.515k	45.8	+0.0	+9.8			+0.0	55.6	81.3	-25.7	None
10	336.658k	45.3	+0.0	+9.8			+0.0	55.1	81.3	-26.2	None

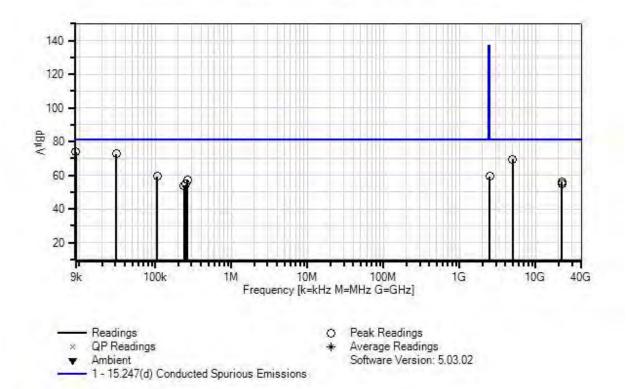


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place	• Fremont, C	A 94539 • (510) 249-1170
Customer:	Enlighted, Inc.		
Specification:	15.247(d) Conducted Spurious Emissions		
Work Order #:	98231	Date:	5/2/2016
Test Type:	Conducted Measurement	Time:	11:03:49 AM
Tested By:	Hieu Song Nguyenpham	Sequence#:	96
Software:	EMITest 5.03.02		

Device	Manufacturer	Model #	S/N
Configuration 1	mininutation	Widden II	DIT
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Not	es:		
Conducted Spurious En			
Frequency Range: 9kH	z to 25000MHz		
11 0	rsion 0.64 for 802.15.4	1	
Application: Smart KF	Studio 7 version 2.1.0 for B	Iuetootn	
Temperature: 21.3°C			
Humidity: 49 %			
Atmospheric Pressure:	101.4kPa		
High Clock: 16MHz	frequency= 2402, 2440 and	2480MHz for BLF	
	frequency= $2405$ , $2440$ and		
Gain of the antenna for	1 2		
Gain of the antenna for	e		
Method: ANSI C63.10	(2013) and KDB 558074v0	3r05 section 11	
RBW=100kHz			
VBW=300kHz			
		t is connected to a spec	ctrum analyzer. It is set continuously
transmitting as intended	d.		
High Channel on TX	Mode on BLE		
ingh Channel off IA			



Enlighted, Inc WO#: 98231 Sequence#: 96 Date: 5/2/2016 15.247(d) Conducted Spurious Emissions Test Distance: None None





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
T2	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Measu	rement Data:	Re	eading lis	ted by ma	argin.		Te	st Distance	e: None		
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	9.131k	64.0	+0.0	+9.8			+0.0	73.8	81.3	-7.5	None
2	30.990k	62.8	+0.0	+9.8			+0.0	72.6	81.3	-8.7	None
3	4959.036M	58.9	+0.8	+9.9			+0.0	69.6	81.3	-11.7	None
4	106.967k	49.6	+0.0	+9.8			+0.0	59.4	81.3	-21.9	None
5	2484.553M	49.0	+0.5	+9.9			+0.0	59.4	81.3	-21.9	None
6	266.004k	47.6	+0.0	+9.8			+0.0	57.4	81.3	-23.9	None
7	22013.472 M	44.5	+1.7	+10.0			+0.0	56.2	81.3	-25.1	None
8	252.707k	45.0	+0.0	+9.8			+0.0	54.8	81.3	-26.5	None
9	21929.640 M	43.1	+1.7	+10.0			+0.0	54.8	81.3	-26.5	None
10	239.672k	44.0	+0.0	+9.8			+0.0	53.8	81.3	-27.5	None

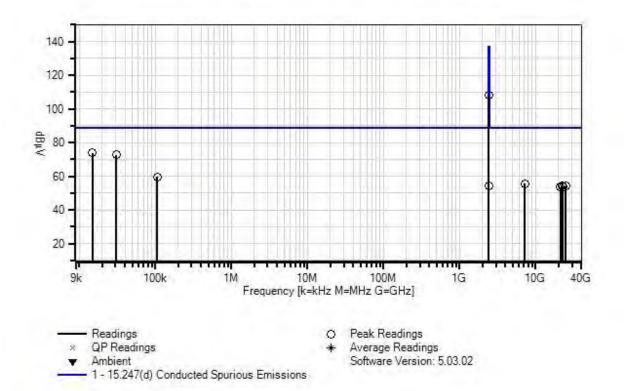


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place	• Fremont, C	A 94539 • (510) 249-1170
Customer:	Enlighted, Inc.		
Specification:	15.247(d) Conducted Spurious Emissions		
Work Order #:	98231	Date:	5/2/2016
Test Type:	Conducted Measurement	Time:	11:46:32 AM
Tested By:	Hieu Song Nguyenpham	Sequence#:	101
Software:	EMITest 5.03.02		

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Notes:			
Conducted Spurious Emis	ssion		
Frequency Range: 9kHz t	to 25000MHz		
Application: PuTTy versi			
Application: Smart RF St	udio 7 version 2.1.0 for B	luetooth	
Temperature: 21.3°C			
Humidity: 49 %			
Atmospheric Pressure: 10	)1.4kPa		
1			
High Clock: 16MHz			
Transmitting operating fr			
Transmitting operating fr	1 2 1	1 2480MHz for 802.15.4	
Gain of the antenna for B			
Gain of the antenna for Z	6	2.05 (* 11	
Method: ANSI C63.10 (2	(013) and KDB 5580/4v0	3r05 section 11	
RBW=100kHz			
VBW=300kHz			
1.2.1. Doomin			
The EUT is placed on	a non-conducted table.	It is connected to a spec	ctrum analyzer. It is set continuously
transmitting as intended.		Ĩ	
Low Channel on TX Mo	ode on 802.15.4		



Enlighted, Inc WO#: 98231 Sequence#: 101 Date: 5/2/2016 15.247(d) Conducted Spurious Emissions Test Distance: None None





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
T2	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Measu	rement Data:	Re	ading lis	ted by ma	argin.		Те	st Distance	e: None		
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	15.002k	63.9	+0.0	+9.8			+0.0	73.7	88.6	-14.9	None
2	30.990k	63.0	+0.0	+9.8			+0.0	72.8	88.6	-15.8	None
3	2403.758M	98.0	+0.5	+9.9			+0.0	108.4	137.0	-28.6	None
4	106.967k	49.8	+0.0	+9.8			+0.0	59.6	88.6	-29.0	None
5	7215.567M	44.6	+1.0	+9.9			+0.0	55.5	88.6	-33.1	None
6	21929.640 M	42.8	+1.7	+10.0			+0.0	54.5	88.6	-34.1	None
7	2397.773M	43.9	+0.5	+9.9			+0.0	54.3	88.6	-34.3	None
8	24790.419 M	42.2	+1.8	+10.0			+0.0	54.0	88.6	-34.6	None
9	22652.694 M	41.9	+1.8	+10.0			+0.0	53.7	88.6	-34.9	None
10	21164.670 M	41.6	+1.7	+10.1			+0.0	53.4	88.6	-35.2	None

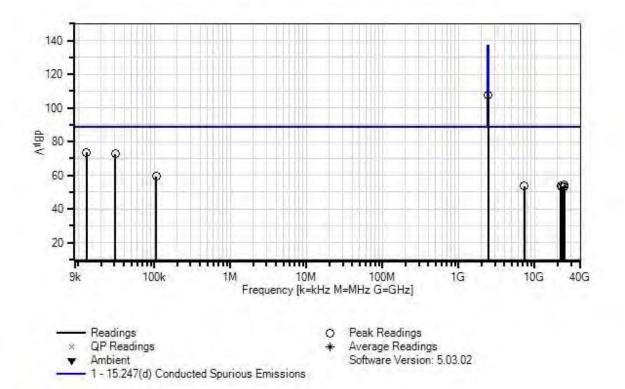


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place	• Fremont, C	A 94539 • (510) 249-1170
Customer:	Enlighted, Inc.		
Specification:	15.247(d) Conducted Spurious Emissions		
Work Order #:	98231	Date:	5/2/2016
Test Type:	Conducted Measurement	Time:	11:40:52 AM
Tested By:	Hieu Song Nguyenpham	Sequence#:	100
Software:	EMITest 5.03.02		

Device	Manufacturer	Model #	S/N
Configuration 1	Manufacturer	π	0/11
<i>Support Equipment:</i> Device	Manufacturer	Model #	C/NI
Configuration 1	Manufacturer	Niodel #	S/N
0			
Test Conditions / Notes			
Conducted Spurious Emi			
Frequency Range: 9kHz	to 25000MHz		
Amplication, DuTTy, your	ion 0.64 for 802 15 4		
Application: PuTTy vers		)]	
Application: Smart KF S	tudio 7 version 2.1.0 for B	fluetooth	
Temperature: 21.3°C			
Humidity: 49 %			
Atmospheric Pressure: 10	)1 4kPa		
runospherie i ressure. re	л.нкі u		
High Clock: 16MHz			
	requency= 2402, 2440 and	2480MHz for BLE	
0 1 0	requency= $2405, 2440$ and		
Gain of the antenna for B	1 0		
Gain of the antenna for Z	igbee= 0dBi		
	2013) and KDB 558074v0	3r05 section 11	
, i i i i i i i i i i i i i i i i i i i	,		
RBW=100kHz			
VBW=300kHz			
	a non-conducted table.	It is connected to a spec	ctrum analyzer. It is set continuously
transmitting as intended.			
Middle Channel on TX	Mode on 802.15.4		



Enlighted, Inc WO#: 98231 Sequence#: 100 Date: 5/2/2016 15.247(d) Conducted Spurious Emissions Test Distance: None None





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
T2	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Measu	rement Data:	Re	eading lis	ted by ma	argin.		Те	st Distance	e: None		
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	12.891k	63.8	+0.0	+9.8			+0.0	73.6	88.6	-15.0	None
2	30.990k	62.9	+0.0	+9.8			+0.0	72.7	88.6	-15.9	None
3	106.967k	49.6	+0.0	+9.8			+0.0	59.4	88.6	-29.2	None
4	2439.667M	97.4	+0.5	+9.9			+0.0	107.8	137.0	-29.2	None
5	24486.527 M	42.2	+1.8	+10.0			+0.0	54.0	88.6	-34.6	None
6	22055.389 M	42.2	+1.7	+10.0			+0.0	53.9	88.6	-34.7	None
7	7318.605M	42.5	+1.0	+9.9			+0.0	53.4	88.6	-35.2	None
8	24413.174 M	41.5	+1.8	+10.0			+0.0	53.3	88.6	-35.3	None
9	22652.694 M	41.4	+1.8	+10.0			+0.0	53.2	88.6	-35.4	None
10	23941.617 M	41.2	+1.9	+10.1			+0.0	53.2	88.6	-35.4	None

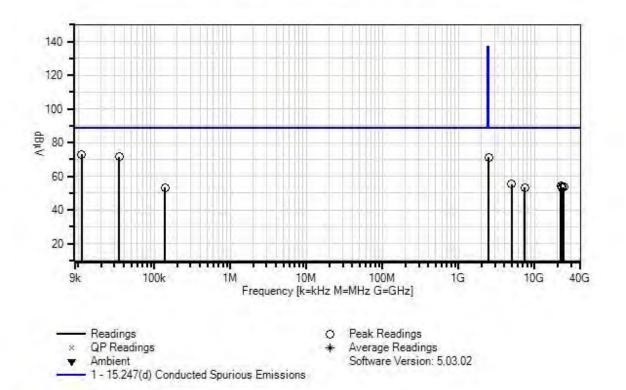


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place	• Fremont, C	A 94539 • (510) 249-1170
Customer:	Enlighted, Inc.		
Specification:	15.247(d) Conducted Spurious Emissions		
Work Order #:	98231	Date:	5/2/2016
Test Type:	Conducted Measurement	Time:	11:35:27 AM
Tested By:	Hieu Song Nguyenpham	Sequence#:	99
Software:	EMITest 5.03.02		

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Not	es:		
Conducted Spurious En	nission		
Frequency Range: 9kH			
11 0	rsion 0.64 for 802.15.4		
Application: Smart RF	Studio 7 version 2.1.0 for B	Bluetooth	
Temperature: 21.3°C			
Humidity: 49 %			
Atmospheric Pressure:	101 4kPa		
runospherie riessure.	101.181.0		
High Clock: 16MHz			
	frequency= 2402, 2440 and	l 2480MHz for BLE	
Transmitting operating	frequency= 2405, 2440 and	1 2480MHz for 802.15.4	
Gain of the antenna for			
Gain of the antenna for			
Method: ANSI C63.10	(2013) and KDB 558074v0	3r05 section 11	
RBW=100kHz			
VBW=300kHz			
V D W -300KHZ			
The EUT is placed o	n a non-conducted table	It is connected to a sp	ectrum analyzer. It is set continuously
transmitting as intende			
6			
High Channel on TX	Mode on 802.15.4		



Enlighted, Inc WO#: 98231 Sequence#: 99 Date: 5/2/2016 15.247(d) Conducted Spurious Emissions Test Distance: None None





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
T2	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Measu	rement Data:	Re	eading lis	ted by ma	argin.		Те	st Distance	e: None		
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	11.131k	63.2	+0.0	+9.8	uD	uD	+0.0	73.0	88.6	-15.6	None
2	34.676k	61.7	+0.0	+9.8			+0.0	71.5	88.6	-17.1	None
3	2484.475M	60.8	+0.5	+9.9			+0.0	71.2	88.6	-17.4	None
4	4956.628M	44.7	+0.8	+9.9			+0.0	55.4	88.6	-33.2	None
5	21929.080 M	42.6	+1.7	+10.0			+0.0	54.3	88.6	-34.3	None
6	22866.906 M	41.8	+1.8	+10.0			+0.0	53.6	88.6	-35.0	None
7	24098.952 M	41.5	+1.9	+10.1			+0.0	53.5	88.6	-35.1	None
8	138.560k	43.5	+0.0	+9.8			+0.0	53.3	88.6	-35.3	None
9	7438.750M	42.4	+1.0	+9.9			+0.0	53.3	88.6	-35.3	None
10	22701.407 M	41.3	+1.8	+10.0			+0.0	53.1	88.6	-35.5	None



## Band Edge

	Band Edge Summary - BLE									
Limit applied:	Limit applied: Max Power/100kHz - 20dB									
Frequency (MHz)ModulationMeasured (dBm)Limit (dBm)Results										
2400.0	O-QPSK	-42.38	<-25.68	Pass						
2483.5	O-QPSK	-43.65	<-25.68	Pass						

	Band Edge Summary - 802.15.4									
Limit applied:	Limit applied: Max Power/100kHz - 20dB									
Frequency (MHz)	Results									
2400.0	O-QPSK	-41.38	<-18.39	Pass						
2483.5	O-QPSK	-41.49	<-18.39	Pass						



## Band Edge Setup / Conditions / Data

Test Location: Customer: Specification: Work Order #: Test Type: Tested By: Software:	CKC Laboratories, Inc. • 1120 I Enlighted, Inc. 15.247(d) Conducted Spurious 98231 Conducted Measurement Hieu Song Nguyenpham EMITest 5.03.02	<b>Emissions</b> D Ti	nt, CA 94539 • (510) 249-1170 Pate: 5/12/2016 me: 16:37:10 cc#: 97
Equipment Test			
<b>Device</b> Configuration 1	Manufacturer	Model #	S/N
	4.		
Support Equipm Device	Manufacturer	Model #	S/N
Configuration 1			
Application: Sma Temperature: 21 Humidity: 49 % Atmospheric Pres High Clock: 16M Transmitting ope: Transmitting ope: Gain of the anten Gain of the anten	Ty version 0.64 for 802.15.4 rt RF Studio 7 version 2.1.0 for Bl 3°C ssure: 101.4kPa	2480MHz for BLE 2480MHz for 802.15.4	4
RBW=100kHz VBW=300kHz The EUT is pla transmitting as in <b>TX Mode on BL</b>	tended.	is connected to a sp	pectrum analyzer. It is set continuous

Test Equip	Test Equipment:									
ID	Asset # Description		Model	<b>Calibration Date</b>	Cal Due Date					
	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017					
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018					
	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016					



Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170							
Customer:	Enlighted, Inc.							
Specification:	15.247(d) Conducted Spurious Emissions							
Work Order #:	98231	Date:	5/12/2016					
Test Type:	Conducted Measurement	Time:	16:36:10					
Tested By:	Hieu Song Nguyenpham	Sequence#:	100					
Software:	EMITest 5.03.02							

Device	Manufacturer	Model #	S/N
Configuration 1			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

## Test Conditions / Notes:

Application: PuTTy version 0.64 for 802.15.4 Application: Smart RF Studio 7 version 2.1.0 for Bluetooth

Temperature: 21.3°C Humidity: 49 % Atmospheric Pressure: 101.4kPa

High Clock: 16MHz Transmitting operating frequency= 2402,2440 and 2480MHz for BLE Transmitting operating frequency= 2405,2440 and 2480MHz for 802.15.4 Gain of the antenna for Bluetooth= 0dBi Gain of the antenna for Zigbee= 0dBi Method: ANSI C63.10 (2013) and 558074 v03r05 section 13.2

RBW=100kHz VBW=300kHz

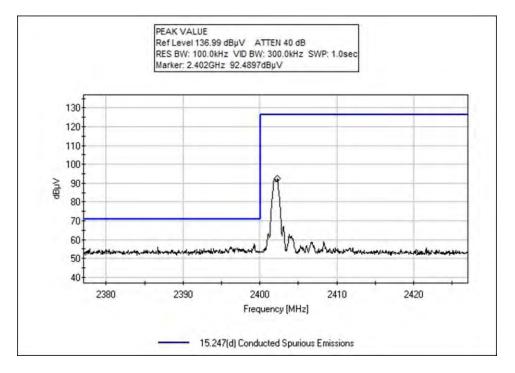
The EUT is placed on non-conducted table. It is connected to a spectrum analyzer. It is set continuously transmitting as intended.

## TX on 802.15.4

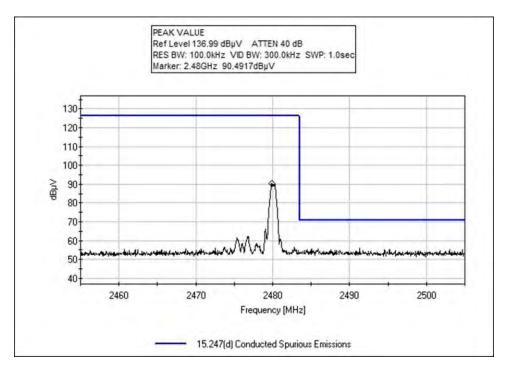
ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
	ANP06900	Cable	32022-29094K-	12/30/2015	12/30/2017
			29094K-36TC		
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016



## **Band Edge Plots**

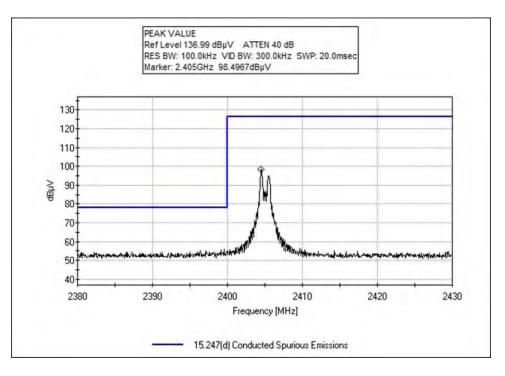


#### BLE, Low Channel

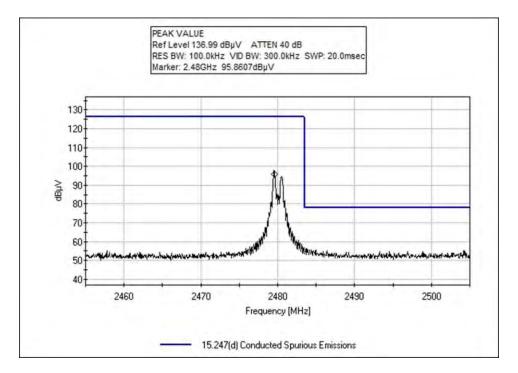


BLE, High Channel





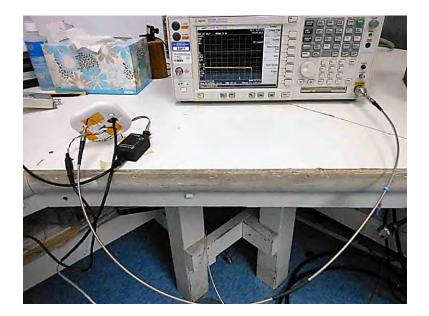
802.15.4, Low Channel



802.15.4, High Channel



## **Test Setup Photo**





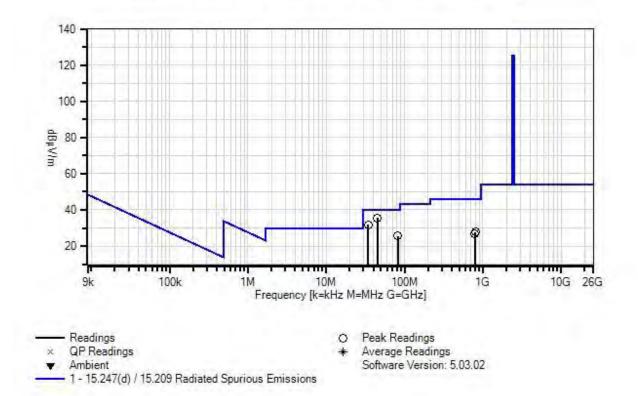
# 15.247(d) Radiated Emissions & Band Edge

## Test Setup / Conditions / Data

Test Location: Customer: Specification: Work Order #: Test Type: Tested By: Software:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 Enlighted, Inc. 15.247(d) / 15.209 Radiated Spurious Emissions 98231 Date: 4/28/2016 Radiated Scan Time: 10:27:21 Hieu Song Nguyenpham Sequence#: 64 EMITest 5.03.02						
Equipment Test							
<b>Device</b> Configuration 1	Manufacturer	Model #	S/N				
Support Equipn Device	nent: Manufacturer	Model #	S/N				
Configuration 1		Model //	0/11				
Test Conditions	/ Notes:						
Radiated Spuriou							
Frequency Range	e: 9kHz to 1000MHz						
		uetooth					
High Clock: 16N	ИНz						
	rating frequency= 2402, 2440 and 2	2480MHz for BLE					
	rating frequency= 2405, 2440 and 2	2480MHz for 802.15.4	1				
	ana for Bluetooth= $0$ dBi						
	na for Zigbee= 0dBi 63.10 (2013) and KDB 558074v03	r05 section 12.2.7					
Wiethou. ANSI C	(2013) and KDB 558074005	105 Section 12.2.7					
	RBW=200 Hz,VBW=200 Hz;						
	z; RBW=9 kHz,VBW=9 kHz;						
	Hz; RBW=120 kHz,VBW=120 kHz 0MHz; RBW=1 MHz,VBW=1 MH	2					
1000 1/172-23000	M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M = 1 M =	Ζ.					
The EUT is place	ed on Styrofoam on a table. It is set	continuously transmit	ting as intended.				
X axis- Direct to	Antenna is the worst orthogonal						
Low Channel or	n TX mode on BLE						



Enlighted, Inc WO#: 98231 Sequence#: 64 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measurement Data:		Re	Reading listed by margin.			Test Distance: 3 Meters					
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	45.108M	51.3	-27.9	+11.3	+0.6	+0.1	+0.0	35.6	40.0	-4.4	Vert
			+0.2								
2	34.419M	42.1	-28.0	+16.8	+0.5	+0.1	+0.0	31.7	40.0	-8.3	Vert
			+0.2								
3	82.298M	44.2	-27.9	+7.9	+0.8	+0.2	+0.0	25.5	40.0	-14.5	Vert
			+0.3								
4	805.004M	28.7	-28.0	+22.0	+3.0	+0.7	+0.0	27.7	46.0	-18.3	Horiz
			+1.3								
5	795.663M	28.3	-28.0	+21.8	+2.9	+0.7	+0.0	27.0	46.0	-19.0	Horiz
			+1.3								

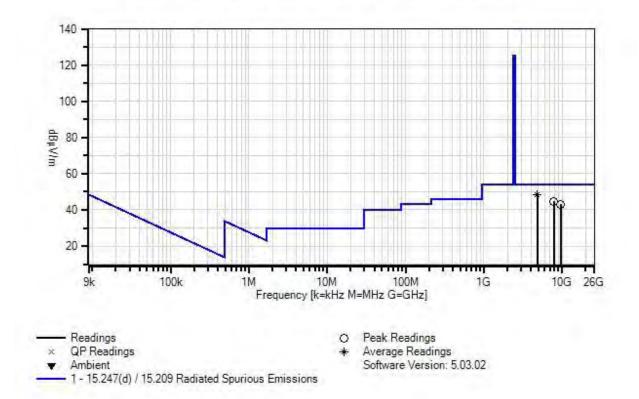


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170				
Customer:	Enlighted, Inc.				
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions			
Work Order #:	98231	Date:	4/25/2016		
Test Type:	Radiated Scan	Time:	13:55:53		
Tested By:	Hieu Song Nguyenpham	Sequence#:	13		
Software:	EMITest 5.03.02				

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Not	es:		
Radiated Spurious Emi			
Frequency Range: 100	0MHz to 25000MHz		
	· 0 ( 4 C 902 15 4		
	rsion 0.64 for 802.15.4 Studio 7 version 2.1.0 for B	luatooth	
Application. Smart KI		lucioom	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure:	101.4kPa		
High Clock: 16MHz	frequency= 2402, 2440 and	2480MHz for DI E	
	frequency=2402, 2440 and frequency=2405, 2440 and		
Gain of the antenna for	1 0	2 10000002.10.1	
Gain of the antenna for	Zigbee= 0dBi		
Method: ANSI C63.10	(2013) and KDB 558074v0	3r05 section 12.2.7	
	=200 Hz,VBW=200 Hz; W=9 kHz,VBW=9 kHz;		
	w –9 knz, v B w –9 knz; BW=120 kHz,VBW=120 kH	17	
	; RBW=1 MHz, VBW=120 KI		
	, <u> </u>		
The EUT is placed on	Styrofoam on a table. It is se	t continuously transmitting	g as intended.
T D O			
	ina is the worst orthogonal		
Low Channel on TX	node on BLE		



Enlighted, Inc WO#: 98231 Sequence#: 13 Date: 4/25/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
Т6	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Meas	urement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	4804.503M	68.6	-57.8	+30.8	+1.8	+3.8	+0.0	48.3	54.0	-5.7	Horiz
	Ave		+0.8	+0.3							
/	4804.503M	73.8	-57.8	+30.8	+1.8	+3.8	+0.0	53.5	54.0	-0.5	Horiz
			+0.8	+0.3							
3	3 7860.856M	58.7	-57.8	+35.2	+2.3	+5.1	+0.0	44.8	54.0	-9.2	Vert
			+1.0	+0.3							
2	4 9608.950M	56.0	-57.2	+34.8	+2.6	+5.4	+0.0	43.0	54.0	-11.0	Vert
			+1.1	+0.3							

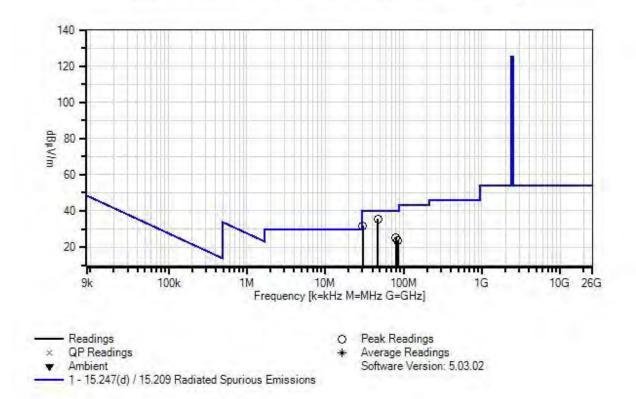


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170				
Customer:	Enlighted, Inc.				
Specification:	15.247(d) / 15.209 Radiated Spurious Emi	ssions			
Work Order #:	98231	Date:	4/28/2016		
Test Type:	Radiated Scan	Time:	10:57:17		
Tested By:	Hieu Song Nguyenpham	Sequence#:	67		
Software:	EMITest 5.03.02				

<i>Equipment Tested:</i> Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment	:		
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / No			
Radiated Spurious En			
Frequency Range: 9k	Hz to 1000MHz		
Application: PuTTy	version 0.64 for 802.15.4		
	F Studio 7 version 2.1.0 for B	luetooth	
Temperature: 20.1°C	2		
Humidity: 45 %			
Atmospheric Pressur	e: 101.4kPa		
High Clock: 16MHz			
6	ng frequency= $2402,2440$ and	2480MHz for BLE	
	ng frequency= 2405,2440 and	2480MHz for 802.15.4	
Gain of the antenna f			
Gain of the antenna f		2.05 / 12.27	
Method: ANSI C63.	0 (2013) and KDB 558074v0.	3r05 section 12.2.7	
9 kHz -150 kHz; RB	W=200 Hz,VBW=200 Hz;		
	BW=9 kHz,VBW=9 kHz;		
	RBW=120 kHz,VBW=120 kH		
1000 MHz-25000MH	Iz; RBW=1 MHz,VBW=1 MH	łz.	
The EUT is placed or	n Styrofoam on a table. It is se	t continuously transmitting	g as intended.
X axis- Direct to Ant	enna is the worst orthogonal		
Middle Channel on	TX mode on BLE		



Enlighted, Inc WO#: 98231 Sequence#: 67 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measur	ement Data:	Re	ading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	46.960M	52.0	-27.9	+10.5	+0.6	+0.1	+0.0	35.5	40.0	-4.5	Vert
			+0.2								
2	30.210M	40.3	-28.0	+18.8	+0.4	+0.1	+0.0	31.8	40.0	-8.2	Vert
			+0.2								
3	80.073M	44.4	-27.9	+7.5	+0.8	+0.2	+0.0	25.3	40.0	-14.7	Vert
			+0.3								
4	85.331M	41.6	-27.9	+8.3	+0.8	+0.2	+0.0	23.3	40.0	-16.7	Horiz
			+0.3								

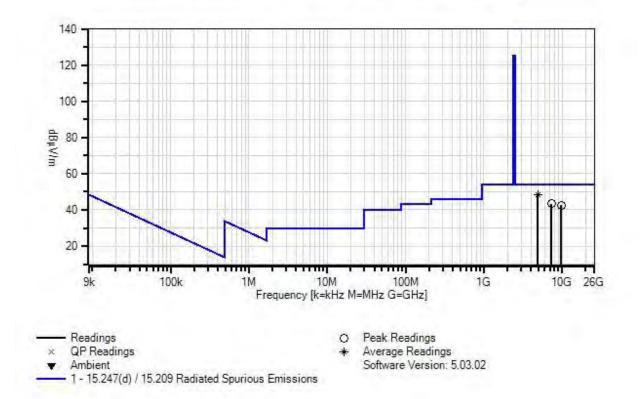


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170				
Customer:	Enlighted, Inc.				
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions			
Work Order #:	98231	Date:	4/25/2016		
Test Type:	Radiated Scan	Time:	14:40:59		
Tested By:	Hieu Song Nguyenpham	Sequence#:	16		
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 / No	tes:			
Radiated Spurious En	nission			
Frequency Range: 10	00MHz to 25000MHz			
	version 0.64 for 802.15.4			
Application: Smart R	F Studio 7 version 2.1.0 for B	luetooth		
T 20.19C				
Temperature: 20.1°C				
Humidity: 45 % Atmospheric Pressure	$\sim 101  h$			
High Clock: 16MHz	2. 101. <del>4</del> KI d			
0	g frequency= 2402,2440 and 2	2480MHz for BLE		
	g frequency= $2405,2440$ and $2$			
Gain of the antenna fo				
Gain of the antenna fo	or Zigbee= 0dBi			
Method: ANSI C63.1	0 (2013) and KDB 558074v03	3r05 section 12.2.7		
	W=200 Hz,VBW=200 Hz;			
· · · · · · · · · · · · · · · · · · ·	3W=9 kHz,VBW=9 kHz;			
-	RBW=120 kHz,VBW=120 kH	-		
1000 MHz-25000MH	z; RBW=1 MHz,VBW=1 MH	łz.		
The EUT is placed on	Styrofoam on a table. It is se	t continuously transmitting	as intended.	
· ·	-			
X axis- Direct to Ante	enna is the worst orthogonal			
Middle Channel on 7	FX mode on BLE			



Enlighted, Inc WO#: 98231 Sequence#: 16 Date: 4/25/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
Т6	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Meas	surement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
	1 4880.064M	68.1	-57.6	+30.9	+1.8	+3.8	+0.0	48.1	54.0	-5.9	Horiz
	Ave		+0.8	+0.3							
	^ 4880.064M	72.0	-57.6	+30.9	+1.8	+3.8	+0.0	52.0	54.0	-2.0	Horiz
			+0.8	+0.3							
	3 7319.504M	58.8	-58.3	+34.3	+2.3	+5.0	+0.0	43.4	54.0	-10.6	Vert
			+1.0	+0.3							
	4 9760.549M	55.7	-57.6	+34.9	+2.6	+5.6	+0.0	42.6	54.0	-11.4	Vert
			+1.1	+0.3							

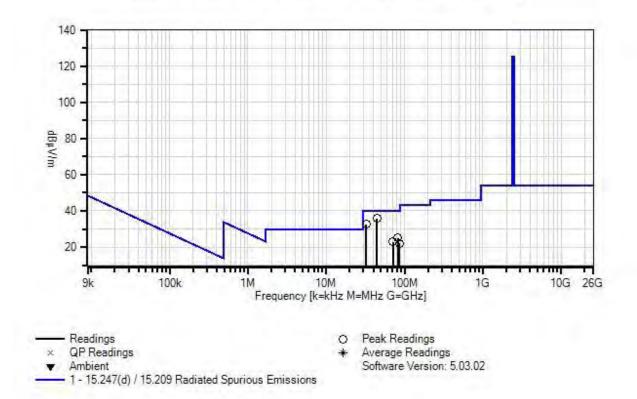


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions				
Work Order #:	98231	Date:	4/28/2016			
Test Type:	Radiated Scan	Time:	11:27:55			
Tested By:	Hieu Song Nguyenpham	Sequence#:	70			
Software:	EMITest 5.03.02					

<i>Equipment Tested:</i> <b>Device</b>	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / No	otes:		
Radiated Spurious Er	nission		
Frequency Range: 9k	Hz to 1000MHz		
Application: DuTTy	version 0.64 for 802.15.4		
	F Studio 7 version 2.1.0 for B	luetooth	
reprication. Sinare R		luctooth	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure	e: 101.4kPa		
High Clock: 16MHz			
	ig frequency= 2402, 2440 and	2480MHz for BLE	
Transmitting operatir	g frequency= 2405, 2440 and	2480MHz for 802.15.4	
Gain of the antenna f			
Gain of the antenna f	e		
Method: ANSI C63.1	0 (2013) and KDB 558074v0	3r05 section 12.2.7	
9 kHz -150 kHz; RBV	W=200 Hz,VBW=200 Hz;		
-	3W=9 kHz,VBW=9 kHz;		
30 MHz-1000 MHz;	RBW=120 kHz,VBW=120 kHz	łz,	
1000 MHz-25000MH	Iz; RBW=1 MHz,VBW=1 MH	łz.	
The EUT is placed or	n Styrofoam on a table. It is se	t continuously transmitting	g as intended.
X axis- Direct to Ant	enna is the worst orthogonal		
High Channel on TX	K mode on BLE		



Enlighted, Inc WO#: 98231 Sequence#: 70 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measur	ement Data:	Re	ading lis	ted by ma	rgin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	44.393M	51.2	-28.0	+11.7	+0.6	+0.1	+0.0	35.8	40.0	-4.2	Vert
			+0.2								
2	32.483M	42.1	-28.0	+17.7	+0.5	+0.1	+0.0	32.6	40.0	-7.4	Vert
			+0.2								
3	82.702M	43.8	-27.9	+7.9	+0.8	+0.2	+0.0	25.1	40.0	-14.9	Vert
			+0.3								
4	71.874M	43.0	-27.8	+6.5	+0.7	+0.2	+0.0	22.9	40.0	-17.1	Vert
			+0.3								
5	85.837M	40.3	-27.8	+8.4	+0.8	+0.2	+0.0	22.2	40.0	-17.8	Horiz
			+0.3								

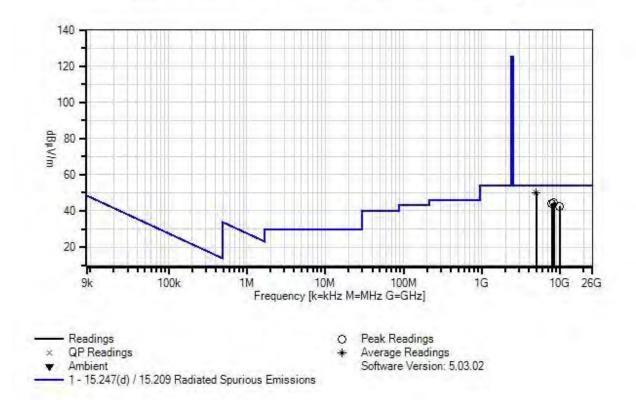


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions				
Work Order #:	98231	Date:	4/25/2016			
Test Type:	Radiated Scan	Time:	15:25:30			
Tested By:	Hieu Song Nguyenpham	Sequence#:	19			
Software:	EMITest 5.03.02					

<i>Equipment Tested:</i> <b>Device</b>	Manufacturer	Model #	S/N	
Configuration 1				
Support Equipment.				
Device	Manufacturer	Model #	S/N	
Configuration 1				
Test Conditions / No	otes:			
Radiated Spurious Er	nission			
Frequency Range: 10	00MHz to 25000MHz			
Application: DuTTy x	version 0.64 for 802.15.4			
	F Studio 7 version 2.1.0 for B	luetooth		
Application. Smart K	r Studio 7 Version 2.1.0 for B	luctootii		
Temperature: 20.1°C				
Humidity: 45 %				
Atmospheric Pressure	e: 101.4kPa			
-				
High Clock: 16MHz				
0 1	g frequency= 2402, 2440 and			
	g frequency= 2405, 2440 and	2480MHz for 802.15.4		
Gain of the antenna f				
Gain of the antenna f	e			
Method: ANSI C63.1	0 (2013) and KDB 558074v03	3r05 section 12.2.7		
9 kHz -150 kHz; RBV	W=200 Hz,VBW=200 Hz;			
-	3W=9 kHz,VBW=9 kHz;			
30 MHz-1000 MHz;	RBW=120 kHz,VBW=120 kH	łz,		
1000 MHz-25000MH	z; RBW=1 MHz,VBW=1 MH	łz.		
The EUT is placed or	n Styrofoam on a table. It is se	t continuously transmitting	g as intended.	
X axis- Direct to Ante	enna is the worst orthogonal			
High Channel on TX	•			



Enlighted, Inc WO#: 98231 Sequence#: 19 Date: 4/25/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
Т6	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Meası	rement Data:	Re	ading list	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	4960.108M	69.5	-57.3	+31.1	+1.8	+3.8	+0.0	50.0	54.0	-4.0	Horiz
	Ave		+0.8	+0.3							
^	4960.108M	73.2	-57.3	+31.1	+1.8	+3.8	+0.0	53.7	54.0	-0.3	Horiz
			+0.8	+0.3							
3	8374.369M	56.2	-56.4	+35.9	+2.4	+5.2	+0.0	44.6	54.0	-9.4	Vert
			+1.0	+0.3							
4	7873.869M	58.0	-57.7	+35.2	+2.3	+5.1	+0.0	44.3	54.0	-9.7	Vert
			+1.0	+0.4							
5	9920.113M	55.4	-57.7	+35.0	+2.6	+5.7	+0.0	42.5	54.0	-11.5	Vert
			+1.1	+0.4							

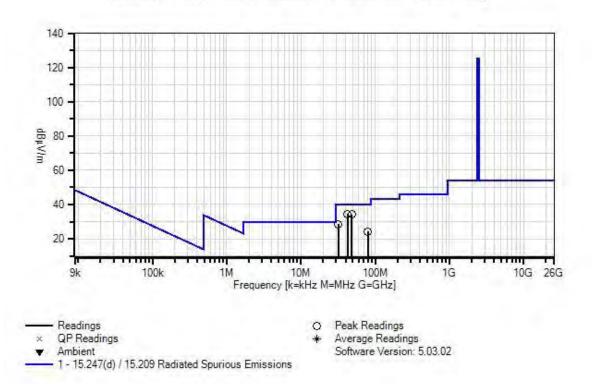


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions				
Work Order #:	98231	Date:	4/28/2016			
Test Type:	Radiated Scan	Time:	09:06:25			
Tested By:	Hieu Song Nguyenpham	Sequence#:	55			
Software:	EMITest 5.03.02					

Device	Manufacturer	Model #	S/N				
Configuration 1							
Support Equipment:							
Device	Manufacturer	Model #	S/N				
Configuration 1							
Test Conditions / No	tes:						
Radiated Spurious En							
Frequency Range: 9kl	Hz to 1000MHz						
Amplication, DuTTy,	ansign 0 64 for 802 15 4						
	ersion 0.64 for 802.15.4 F Studio 7 version 2.1.0 for B	luetooth					
Application. Smart R		luctooth					
Temperature: 20.1°C							
Humidity: 45 %							
Atmospheric Pressure	: 101.4kPa						
High Clock: 16MHz							
	g frequency= 2402, 2440 and	2480MHz for BLE					
	g frequency= $2405$ , $2440$ and						
Gain of the antenna fo							
Gain of the antenna fo							
Method: ANSI C63.1	0 (2013) and KDB 558074v0.	3r05 section 12.2.7					
9 kHz -150 kHz· RBV	V=200 Hz,VBW=200 Hz;						
· · · · · · · · · · · · · · · · · · ·	W=9 kHz,VBW=9 kHz;						
	RBW=120 kHz,VBW=120 kHz	łz,					
1000 MHz-25000MH	z; RBW=1 MHz,VBW=1 MI	Hz.					
The EUT is placed on	Styrofoam on a table. It is se	t continuously transmittin	g as intended.				
Ĩ	·	•	-				
	X axis- Direct to Antenna is the worst orthogonal						
Low Channel on TX	mode on 802.15.4						



Enlighted, Inc WD#: 98231 Sequence#: 55 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measu	rement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	42.794M	49.2	-28.0	+12.4	+0.6	+0.1	+0.0	34.5	40.0	-5.5	Vert
			+0.2								
2	48.307M	51.2	-27.9	+9.9	+0.6	+0.1	+0.0	34.1	40.0	-5.9	Vert
			+0.2								
3	32.146M	37.9	-28.0	+17.8	+0.5	+0.1	+0.0	28.5	40.0	-11.5	Vert
			+0.2								
4	79.770M	43.2	-27.9	+7.5	+0.8	+0.2	+0.0	24.1	40.0	-15.9	Vert
			+0.3								

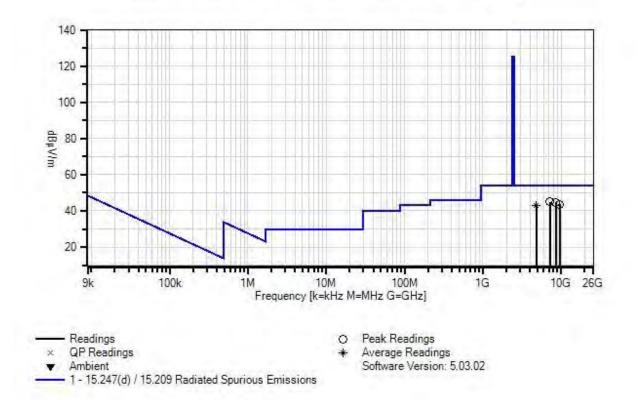


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions				
Work Order #:	98231	Date:	4/25/2016			
Test Type:	Radiated Scan	Time:	10:49:12			
Tested By:	Hieu Song Nguyenpham	Sequence#:	4			
Software:	EMITest 5.03.02					

<i>Equipment Testea:</i> Device	Manufacturer	Model #	S/N				
Configuration 1							
Support Equipment:							
Device	Manufacturer	Model #	S/N				
Configuration 1							
Test Conditions / No.	tes:						
Radiated Spurious Em	ission						
Frequency Range: 100	00MHz to 25000MHz						
Application DuTTy y	ersion 0.64 for 802.15.4						
	F Studio 7 version 2.1.0 for E	Rluetooth					
rppheaton. Smart R							
Temperature: 20.1°C							
Humidity: 45 %							
Atmospheric Pressure	: 101.4kPa						
High Clock: 16MHz							
	g frequency= 2402, 2440 and	2480MHz for BLE					
	g frequency= 2405, 2440 and						
Gain of the antenna fo							
Gain of the antenna fo							
Method: ANSI C63.10	0 (2013) and KDB 558074v0	3r05 section 12.2.7					
9 kHz -150 kHz: RBW	V=200 Hz,VBW=200 Hz;						
	W=9 kHz,VBW=9 kHz;						
30 MHz-1000 MHz; F	RBW=120 kHz,VBW=120 kl	Hz,					
1000 MHz-25000MHz	1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.						
The EUT is placed on	The EUT is placed on Styrofoam on a table. It is set continuously transmitting as intended.						
X axis- Direct to Ante	X axis- Direct to Antenna is the worst orthogonal						
Low Channel on TX	6						



Enlighted, Inc WO#: 98231 Sequence#: 4 Date: 4/25/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
T6	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Meası	rement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	7213.209M	60.6	-58.3	+34.1	+2.2	+5.0	+0.0	44.9	54.0	-9.1	Horiz
			+1.0	+0.3							
2	8583.578M	56.1	-56.1	+35.9	+2.4	+5.1	+0.0	44.8	54.0	-9.2	Vert
			+1.0	+0.4							
3	9622.045M	56.6	-57.2	+34.8	+2.6	+5.4	+0.0	43.6	54.0	-10.4	Vert
			+1.1	+0.3							
4	4810.974M	63.1	-57.8	+30.8	+1.8	+3.8	+0.0	42.8	54.0	-11.2	Vert
	Ave		+0.8	+0.3							
^	4810.974M	71.0	-57.8	+30.8	+1.8	+3.8	+0.0	50.7	54.0	-3.3	Vert
			+0.8	+0.3							
6	4808.969M	63.0	-57.8	+30.8	+1.8	+3.8	+0.0	42.7	54.0	-11.3	Vert
	Ave		+0.8	+0.3							
^	4808.969M	70.5	-57.8	+30.8	+1.8	+3.8	+0.0	50.2	54.0	-3.8	Vert
			+0.8	+0.3							

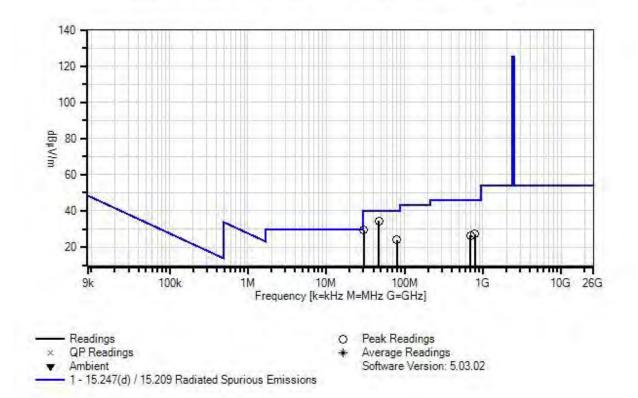


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	sions				
Work Order #:	98231	Date:	4/28/2016			
Test Type:	Radiated Scan	Time:	09:36:40			
Tested By:	Hieu Song Nguyenpham	Sequence#:	58			
Software:	EMITest 5.03.02					

Device	Manufacturer	Model #	S/N				
Configuration 1							
Support Equipment:							
Device	Manufacturer	Model #	S/N				
Configuration 1							
Test Conditions / Not	es:						
Radiated Spurious Em							
Frequency Range: 9kH	z to 1000MHz						
	rsion 0.64 for 802.15.4	1					
Application: Smart RF	Studio 7 version 2.1.0 for B	luetooth					
Temperature: 20.1°C							
Humidity: 45 %							
Atmospheric Pressure:	101.4kPa						
High Clock: 16MHz							
	frequency= 2402,2440 and						
	frequency= $2405,2440$ and	2480MHz for 802.15.4					
Gain of the antenna for Gain of the antenna for							
	(2013) and KDB 558074v0	3r05 section 12.2.7					
1000. ANDI C03.10	(2015) and KDD 5500/400.	5105 5001011 12.2.7					
9 kHz -150 kHz; RBW	=200 Hz,VBW=200 Hz;						
150 kHz-30 MHz; RB	W=9 kHz,VBW=9 kHz;						
30 MHz-1000 MHz; R	BW=120 kHz,VBW=120 kH	łz,					
1000 MHz-25000MHz	; RBW=1 MHz,VBW=1 MH	łz.					
The EUT is placed on	Styrofoam on a table. It is se	t continuously transmittin	g as intended.				
	•	2	-				
	X axis- Direct to Antenna is the worst orthogonal						
Middle Channel on T	X mode on 802.15.4						



Enlighted, Inc WO#: 98231 Sequence#: 58 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measu	rement Data:	Re	ading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	47.170M	51.0	-27.9	+10.4	+0.6	+0.1	+0.0	34.4	40.0	-5.6	Vert
			+0.2								
2	30.084M	37.7	-28.0	+18.9	+0.4	+0.1	+0.0	29.3	40.0	-10.7	Vert
			+0.2								
3	79.972M	43.1	-27.9	+7.5	+0.8	+0.2	+0.0	24.0	40.0	-16.0	Vert
			+0.3								
4	797.414M	28.3	-28.0	+21.9	+2.9	+0.7	+0.0	27.1	46.0	-18.9	Horiz
			+1.3								
5	693.494M	29.5	-28.2	+20.4	+2.8	+0.7	+0.0	26.4	46.0	-19.6	Horiz
			+1.2								

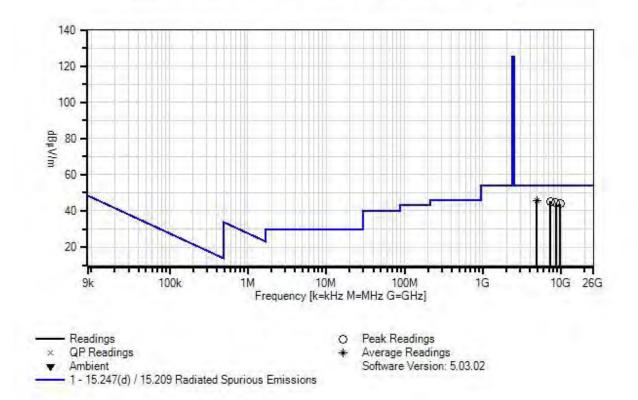


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions				
Work Order #:	98231	Date:	4/25/2016			
Test Type:	Radiated Scan	Time:	11:36:36			
Tested By:	Hieu Song Nguyenpham	Sequence#:	7			
Software:	EMITest 5.03.02					

Device	Manufacturer	Model #	S/N			
Configuration 1						
Support Equipment:						
Device	Manufacturer	Model #	S/N			
Configuration 1						
Test Conditions / No	otes:					
Radiated Spurious En	nission					
Frequency Range: 10	00MHz to 25000MHz					
	rersion 0.64 for 802.15.4	1				
Application: Smart R	F Studio 7 version 2.1.0 for E	sluetooth				
Temperature: 20.1°C						
Humidity: 45 %						
Atmospheric Pressure	:: 101.4kPa					
High Clock: 16MHz	6 2402 2440 1					
	g frequency= 2402,2440 and g frequency= 2405,2440 and					
Gain of the antenna fo		24601/11/2 101 602.13.4				
Gain of the antenna fo						
	0 (2013) and KDB 558074v0	3r05 section 12.2.7				
	W=200 Hz,VBW=200 Hz;					
5	W=9 kHz,VBW=9 kHz;	т_				
	30 MHz-1000 MHz; RBW=120 kHz,VBW=120 kHz, 1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.					
1000 10112-2300010111	Z, KD W -1 WHIZ, V D W -1 WH	112.				
The EUT is placed on	Styrofoam on a table. It is se	et continuously transmittin	g as intended.			
	enna is the worst orthogonal					
Middle Channel on 7	ГХ mode on 802.15.4					



Enlighted, Inc WO#: 98231 Sequence#: 7 Date: 4/25/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
T6	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Meas	urement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	$dB\mu V/m$	dB	Ant
1	4879.029M	65.7	-57.6	+30.9	+1.8	+3.8	+0.0	45.7	54.0	-8.3	Vert
	Ave		+0.8	+0.3							
^	4879.029M	72.7	-57.6	+30.9	+1.8	+3.8	+0.0	52.7	54.0	-1.3	Vert
			+0.8	+0.3							
3	4881.039M	65.4	-57.6	+30.9	+1.8	+3.8	+0.0	45.4	54.0	-8.6	Vert
	Ave		+0.8	+0.3							
^	4881.039M	72.7	-57.6	+30.9	+1.8	+3.8	+0.0	52.7	54.0	-1.3	Vert
			+0.8	+0.3							
5	5 7318.314M	60.7	-58.3	+34.3	+2.3	+5.0	+0.0	45.3	54.0	-8.7	Horiz
			+1.0	+0.3							
6	6 8590.585M	55.8	-56.1	+35.9	+2.4	+5.1	+0.0	44.5	54.0	-9.5	Vert
			+1.0	+0.4							
7	9762.080M	57.0	-57.6	+34.9	+2.6	+5.6	+0.0	43.9	54.0	-10.1	Vert
			+1.1	+0.3							

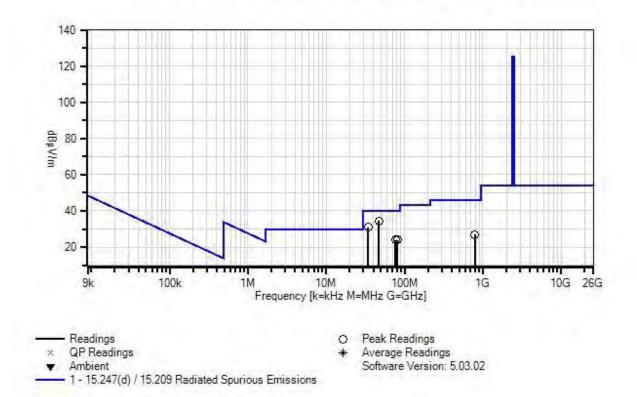


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	sions				
Work Order #:	98231	Date:	4/28/2016			
Test Type:	Radiated Scan	Time:	09:59:51			
Tested By:	Hieu Song Nguyenpham	Sequence#:	61			
Software:	EMITest 5.03.02					

<i>Equipment Tested:</i> Device	Manufacturer	Model #	S/N				
Configuration 1							
Support Equipment	•						
Device	Manufacturer	Model #	S/N				
Configuration 1							
Test Conditions / N							
Radiated Spurious E							
Frequency Range: 91	Hz to 1000MHz						
Application: PuTTy	version 0.64 for 802.15.4						
	F Studio 7 version 2.1.0 for B	luetooth					
Temperature: 20.1°C	2						
Humidity: 45 %							
Atmospheric Pressur	e: 101.4kPa						
High Clock: 16MHz	,						
	ng frequency= $2402$ , $2440$ and	2480MHz for BLE					
	ng frequency= $2405$ , $2440$ and						
Gain of the antenna f							
Gain of the antenna f							
Method: ANSI C63.	10 (2013) and KDB 558074v0.	3r05 section 12.2.7					
9 kHz -150 kHz: RB	W=200 Hz,VBW=200 Hz;						
· · · · · · · · · · · · · · · · · · ·	BW=9  kHz, VBW=9  kHz;						
,	RBW=120 kHz,VBW=120 kH	łz,					
1000 MHz-25000MI	1000 MHz-25000MHz; RBW=1 MHz,VBW=1 MHz.						
The EUT is placed o	n Styrofoam on a table. It is se	t continuously transmitting	g as intended.				
X axis- Direct to Antenna is the worst orthogonal							
High Channel on T	X mode on 802.15.4						



Enlighted, Inc WO#: 98231 Sequence#: 61 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measur	ement Data:	Re	ading lis	ted by ma	rgin.		Te	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	47.086M	51.1	-27.9	+10.4	+0.6	+0.1	+0.0	34.5	40.0	-5.5	Vert
			+0.2								
2	34.166M	41.2	-28.0	+16.9	+0.5	+0.1	+0.0	30.9	40.0	-9.1	Vert
			+0.2								
3	76.433M	43.5	-27.8	+7.1	+0.7	+0.2	+0.0	24.0	40.0	-16.0	Vert
			+0.3								
4	81.084M	42.8	-27.9	+7.7	+0.8	+0.2	+0.0	23.9	40.0	-16.1	Vert
			+0.3								
5	795.663M	28.3	-28.0	+21.8	+2.9	+0.7	+0.0	27.0	46.0	-19.0	Horiz
			+1.3								

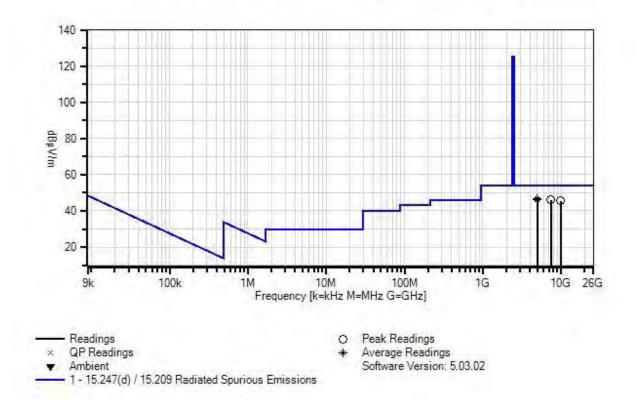


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions				
Work Order #:	98231	Date:	4/25/2016			
Test Type:	Radiated Scan	Time:	12:06:56			
Tested By:	Hieu Song Nguyenpham	Sequence#:	10			
Software:	EMITest 5.03.02					

<i>Equipment Tested:</i> Device	Manufacturer	Model #	S/N			
Configuration 1	Manufacturer	Widder #	0/11			
Support Equipment:						
Device	Manufacturer	Model #	S/N			
Configuration 1						
Test Conditions / Note	s:					
Radiated Spurious Emis						
Frequency Range: 1000	MHz to 25000MHz					
Application: PuTTy ver	sion 0.64 for 802.15.4 Studio 7 version 2.1.0 for B	Ilustaath				
Application. Smart KI's		Juctootii				
Temperature: 20.1°C						
Humidity: 45 %						
Atmospheric Pressure:	101.4kPa					
High Clock: 16MHz						
	frequency= 2402, 2440 and	2480MHz for BLE				
Transmitting operating	frequency= 2405, 2440 and					
Gain of the antenna for						
Gain of the antenna for	e	2.05 (* 12.2.7				
Method: ANSI C65.10	(2013) and KDB 558074v0	5r05 section 12.2.7				
9 kHz -150 kHz; RBW=	=200 Hz,VBW=200 Hz;					
150 kHz-30 MHz; RBW	V=9 kHz,VBW=9 kHz;					
-	3W=120 kHz,VBW=120 kHz	·				
1000 MHz-25000MHz;	RBW=1 MHz,VBW=1 MI	Hz.				
The EUT is placed on S	tyrofoam on a table. It is se	et continuously transmittin	g as intended.			
X axis- Direct to Antenna is the worst orthogonal						
High Channel on TX r	node on 802.15.4					



Enlighted, Inc WO#: 98231 Sequence#: 10 Date: 4/25/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
Т6	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Meası	rement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	4958.972M	66.1	-57.3	+31.1	+1.8	+3.8	+0.0	46.6	54.0	-7.4	Vert
	Ave		+0.8	+0.3							
^	4958.972M	73.0	-57.3	+31.1	+1.8	+3.8	+0.0	53.5	54.0	-0.5	Vert
			+0.8	+0.3							
3	4960.987M	65.8	-57.3	+31.1	+1.8	+3.8	+0.0	46.3	54.0	-7.7	Vert
	Ave		+0.8	+0.3							
^	4960.987M	72.8	-57.3	+31.1	+1.8	+3.8	+0.0	53.3	54.0	-0.7	Vert
			+0.8	+0.3							
5	7441.437M	61.2	-58.2	+34.4	+2.3	+5.1	+0.0	46.1	54.0	-7.9	Vert
			+1.0	+0.3							
6	9921.915M	58.4	-57.7	+35.0	+2.6	+5.7	+0.0	45.5	54.0	-8.5	Vert
			+1.1	+0.4							

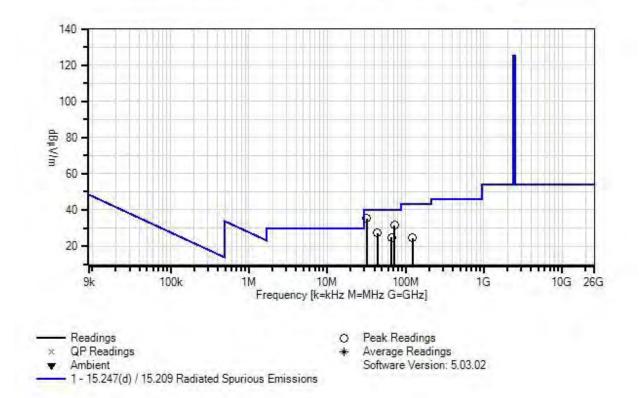


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emis	sions				
Work Order #:	98231	Date:	4/28/2016			
Test Type:	Radiated Scan	Time:	14:20:00			
Tested By:	Hieu Song Nguyenpham	Sequence#:	76			
Software:	EMITest 5.03.02					

Device	Manufacturer	Model #	S/N
Configuration 2			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Test Conditions / Note			
Radiated Spurious Em			
Frequency Range: 9kHz	z to 1000MHz		
Application: PuTTy ver	sion 0.64 for 802 15.4		
	Studio 7 version 2.1.0 for E	Bluetooth	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure: 1	101.4kPa		
High Clock: 16MHz			
	frequency= 2402, 2440 and	2480MHz for BI F	
	frequency= $2402$ , $2440$ and frequency= $2405$ , $2440$ and		
Gain of the antenna for		2400WIII2 IOI 002.13.4	
Gain of the antenna for			
	(2013) and KDB 558074v0	3r05 section 12.2.7	
9 kHz -150 kHz; RBW=			
150 kHz-30 MHz; RBW		T	
	3W=120 kHz,VBW=120 kl RBW=1 MHz,VBW=1 MI		
1000 MHZ-23000MHZ;	KDW-1WINZ, VDW-1WI	ПΖ.	
The EUT is placed on S	tyrofoam on a table. It is se	et continuously transmittin	g as intended.
L.	•	·	
	res that the Main Board of	f the Configuration 2 is sin	milar to the Configuration 1, but it has
different cover.		с	
	ut power and choosing the	worst case of transmittin	g operating frequency to test Radiated
Spurious Emission.			
X axis- Direct to Antenn	na is the worst orthogonal		
	ode is the worst transmit	ting operating frequency	for BLE



Enlighted, Inc WO#: 98231 Sequence#: 76 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measur	rement Data:	Re	ading lis	ted by ma	rgin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	32.188M	44.7	-28.0	+17.8	+0.5	+0.1	+0.0	35.3	40.0	-4.7	Vert
			+0.2								
2	72.084M	51.7	-27.8	+6.5	+0.7	+0.2	+0.0	31.6	40.0	-8.4	Vert
			+0.3								
3	44.014M	42.4	-28.0	+11.8	+0.6	+0.1	+0.0	27.1	40.0	-12.9	Horiz
			+0.2								
4	66.108M	45.5	-27.9	+6.2	+0.7	+0.1	+0.0	24.8	40.0	-15.2	Vert
			+0.2								
5	122.645M	38.8	-27.7	+11.8	+1.0	+0.2	+0.0	24.5	43.5	-19.0	Horiz
			+0.4								



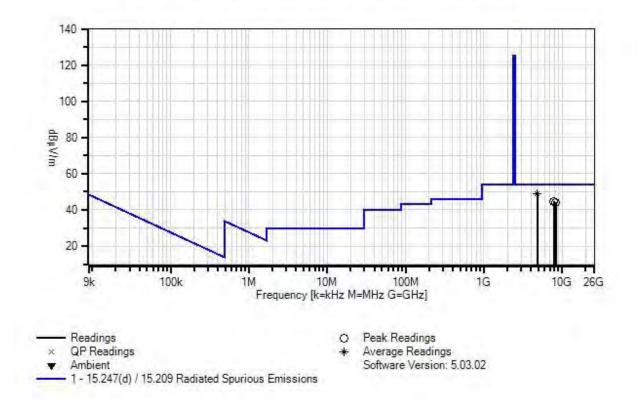
Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions				
Work Order #:	98231	Date:	4/26/2016			
Test Type:	Radiated Scan	Time:	15:52:59			
Tested By:	Hieu Song Nguyenpham	Sequence#:	33			
Software:	EMITest 5.03.02	•				

<i>Equipment Tested:</i> Device	Manufacturer	Model #	S/N
Configuration 2			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Test Conditions / No			
Radiated Spurious Em			
Frequency Range: 100	00MHz to 25000MHz		
۸			
	ersion 0.64 for 802.15.4 5 Studio 7 version 2.1.0 for B	luetooth	
Application. Smart R		nuetooth	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure	: 101.4kPa		
High Clock: 16MHz	g frequency= 2402, 2440 and	2480MHz for BIE	
	g frequency= $2402$ , $2440$ and g frequency= $2405$ , $2440$ and		
Gain of the antenna fo		2 10000112 101 002.13.1	
Gain of the antenna fo			
	0 (2013) and KDB 558074v0	3r05 section 12.2.7	
0 1-11- 150 1-11- DDW	7-200 H- VDW-200 H-		
-	V=200 Hz,VBW=200 Hz; W=9 kHz,VBW=9 kHz;		
· · · · · · · · · · · · · · · · · · ·	RBW=120 kHz,VBW=120 kHz	47	
	z; RBW=1 MHz,VBW=1 MI		
	, ,		
The EUT is placed on	Styrofoam on a table. It is se	et continuously transmitting	g as intended.
The mean fraction of the	1 that the Main Daniel of	Seles Configuration 2 is sin	ilen to the Configuration 1 best it has
different cover.	lares that the Main Board of	the Configuration 2 is sin	nilar to the Configuration 1, but it has
	tout power and choosing the	worst case of transmitting	g operating frequency to test Radiated
Spurious Emission.	r - r		,
	nna is the worst orthogonal		

Low Channel on TX mode on BLE is the worst transmitting operating frequency for BLE



Enlighted, Inc WO#: 98231 Sequence#: 33 Date: 4/26/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
Т6	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Measu	urement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	$dB\mu V/m$	dB	Ant
1	4804.103M	69.4	-57.8	+30.8	+1.8	+3.8	+0.0	49.1	54.0	-4.9	Horiz
	Ave		+0.8	+0.3							
^	4804.103M	73.1	-57.8	+30.8	+1.8	+3.8	+0.0	52.8	54.0	-1.2	Horiz
			+0.8	+0.3							
3	7860.710M	58.5	-57.8	+35.2	+2.3	+5.1	+0.0	44.6	54.0	-9.4	Vert
			+1.0	+0.3							
4	8365.360M	55.9	-56.4	+35.9	+2.4	+5.2	+0.0	44.3	54.0	-9.7	Vert
			+1.0	+0.3							

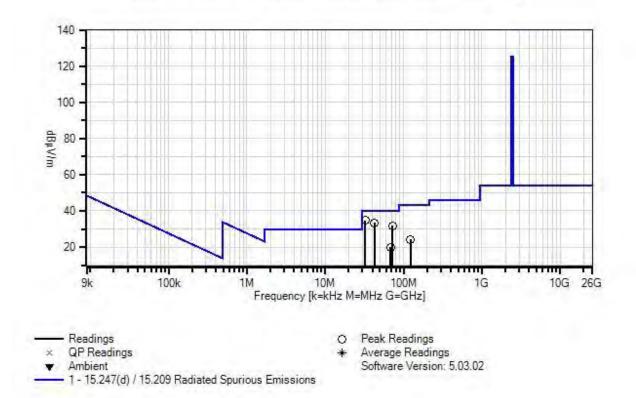


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170					
Customer:	Enlighted, Inc.					
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	sions				
Work Order #:	98231	Date:	4/28/2016			
Test Type:	Radiated Scan	Time:	13:15:02			
Tested By:	Hieu Song Nguyenpham	Sequence#:	73			
Software:	EMITest 5.03.02	-				

Device	Manufacturer	Model #	S/N
Configuration 2			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Test Conditions / Not			
Radiated Spurious Emi			
Frequency Range: 9kH	z to 1000MHz		
Application: PuTTy ve	rsion 0.64 for 802.15.4		
	Studio 7 version 2.1.0 for B	luetooth	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure:	101.4kPa		
High Clock: 16MHz			
	frequency= 2402, 2440 and	2480MHz for BLE	
	frequency= $2405$ , $2440$ and		
Gain of the antenna for			
Gain of the antenna for			
Method: ANSI C63.10	(2013) and KDB 558074v0	3r05 section 12.2.7	
0 1.11- 150 1.11- DDW			
	=200 Hz,VBW=200 Hz; W=9 kHz,VBW=9 kHz;		
	BW=120  kHz, VBW=120  kHz	47	
	; RBW=1 MHz,VBW=1 MI		
	, 100		
The EUT is placed on	Styrofoam on a table. It is se	t continuously transmittin	ng as intended.
	ares that the Main Board of	the Configuration 2 is si	milar to the Configuration 1, but it has
different cover.	ant names and shassing the	would append of the manifiting	ng operating frequency to test Radiated
Spurious Emission.	put power and choosing the	worst case of transmittin	ig operating frequency to test Radiated
Sparious Linission.			
X axis- Direct to Anter	nna is the worst orthogonal		
	mode is the worst transmit	ting operating frequenc	y for 802.15.4



Enlighted, Inc WO#: 98231 Sequence#: 73 Date: 4/28/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
T2	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
Т3	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	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Measur	ement Data:	Re	ading lis	ted by ma	rgin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	32.273M	44.1	-28.0	+17.8	+0.5	+0.1	+0.0	34.7	40.0	-5.3	Vert
			+0.2								
2	42.667M	48.1	-28.0	+12.4	+0.6	+0.1	+0.0	33.4	40.0	-6.6	Vert
			+0.2								
3	72.489M	52.0	-27.8	+6.5	+0.7	+0.2	+0.0	31.9	40.0	-8.1	Vert
			+0.3								
4	122.341M	38.6	-27.7	+11.8	+1.0	+0.2	+0.0	24.3	43.5	-19.2	Horiz
			+0.4								
5	68.381M	40.5	-27.9	+6.2	+0.7	+0.1	+0.0	19.9	40.0	-20.1	Horiz
			+0.3								

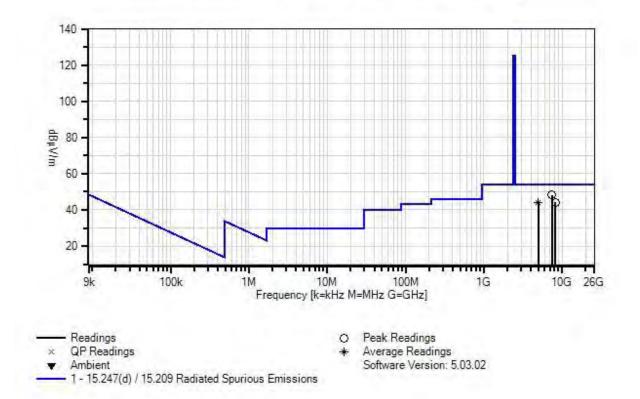


Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170						
Customer:	Enlighted, Inc.						
Specification:	15.247(d) / 15.209 Radiated Spurious Emiss	ions					
Work Order #:	98231	Date:	4/26/2016				
Test Type:	Radiated Scan	Time:	16:42:21				
Tested By:	Hieu Song Nguyenpham	Sequence#:	36				
Software:	EMITest 5.03.02	•					

Derrice	Manufacturer	Model #	S/N
Device	Manufacturer	Wodel #	5/IN
Configuration 2			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 2			
Test Conditions / Notes	5:		
Radiated Spurious Emis	sion		
Frequency Range: 1000	MHz to 25000MHz		
Application: PuTTy vers			
Application: Smart RF S	Studio 7 version 2.1.0 for B	Bluetooth	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure: 1	01.4kPa		
High Clock: 16MHz			
Transmitting operating f	requency= 2402, 2440 and	2480MHz for BLE	
	requency= 2405, 2440 and	2480MHz for 802.15.4	
Gain of the antenna for I			
Gain of the antenna for Z			
Method: ANSI C63.10 (	2013) and KDB 558074v0	3r05 section 12.2.7	
9 kHz -150 kHz; RBW=	200  Hz  VDW = 200  Hz.		
150 kHz-30 MHz; RBW			
	W = 120  kHz, VBW = 120  kHz	47	
	RBW=1 MHz,VBW=1 MI		
1000 mill <b>20</b> 000mill,	100 ··· 1 ····		
The EUT is placed on St	tyrofoam on a table. It is se	et continuously transmittin	ng as intended.
			-
	res that the Main Board of	the Configuration 2 is si	imilar to the Configuration 1, but it has
different cover.			
	it power and choosing the	worst case of transmittin	ng operating frequency to test Radiated
Spurious Emission.			
Varia Direct to Antonn	a is the warst orthogenel		
	a is the worst orthogonal tode is the worst transmit	tting anarating fraguene	w for 802 15 4
Ingh Channel on IA II	ioue is the worst transmi	ting operating frequence	y 101 002.13.4



Enlighted, Inc WO#: 98231 Sequence#: 36 Date: 4/26/2016 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
T2	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
Т3	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
T4	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
T5	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
Т6	AN03309	High Pass Filter	11SH10- 1/18/2016 3000/T10000- O/O		1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017

Measu	urement Data:	Re	eading lis	ted by ma	argin.		Те	est Distance	e: 3 Meters		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	$dB\mu V/m$	dB	Ant
1	7438.978M	63.4	-58.2	+34.4	+2.3	+5.1	+0.0	48.3	54.0	-5.7	Vert
			+1.0	+0.3							
2	4959.088M	63.8	-57.3	+31.1	+1.8	+3.8	+0.0	44.3	54.0	-9.7	Vert
	Ave		+0.8	+0.3							
^	4959.088M	71.0	-57.3	+31.1	+1.8	+3.8	+0.0	51.5	54.0	-2.5	Vert
			+0.8	+0.3							
4	8201.959M	56.4	-56.8	+35.7	+2.4	+5.2	+0.0	44.3	54.0	-9.7	Vert
			+1.0	+0.4							
5	4961.028M	63.4	-57.3	+31.1	+1.8	+3.8	+0.0	43.9	54.0	-10.1	Vert
	Ave		+0.8	+0.3							
^	4961.028M	70.9	-57.3	+31.1	+1.8	+3.8	+0.0	51.4	54.0	-2.6	Vert
			+0.8	+0.3							



# Band Edge

	Band Edge Summary – BLE – Configuration 1									
Frequency (MHz) Modulation Ant. Type		Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results					
2400.0	O-QPSK	Integral	43.9	<54	Pass					
2483.5	O-QPSK	Integral	42.7	<54	Pass					

	Band Edge Summary – 802.15.4 – Configuration 1									
Frequency (MHz) Modulation Ant. Type			Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results					
2400.0	O-QPSK	Integral	42.9	<54	Pass					
2483.5	O-QPSK	Integral	43.2	<54	Pass					



# Band Edge Test Setup / Conditions / Data

Test Location: Customer: Specification: Work Order #: Test Type: Tested By: Software:	CKC Laboratories, Inc. • 1120 F Enlighted, Inc. 15.247(d) / 15.209 Radiated Spu 98231 Radiated Scan Hieu Song Nguyenpham EMITest 5.03.02	urious Emissions Da	ate: 4/25/2016 me: 13:55:53
Equipment Test			
<b>Device</b> Configuration 1	Manufacturer	Model #	S/N
Support Equipn Device	Manufacturer	Model #	S/N
Configuration 1			0/11
Test Conditions	/ Notes:		
Band Edge			
		uetooth	
Transmitting ope Gain of the anten Gain of the anten Method: ANSI C	rating frequency= 2402,2440 and 2 rating frequency= 2405,2440 and 2 na for Bluetooth= 0dBi na for Zigbee= 0dBi 63.10 (2013) and KDB 558074v03	480MHz for 802.15.4 r05 section 13	
-	d on Styrofoam on a table. It is set Antenna is the worst orthogonal	continuously transmitt	ting.



ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
	AN03114	Preamp	AMF-7D- 00101800-30-	4/22/2015	4/22/2017
	41/02/42		10P	2/2/2015	2/2/2017
	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017



CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170							
Enlighted, Inc.							
15.247(d) / 15.209 Radiated Spurious Emiss	ions						
98231	Date:	4/25/2016					
Radiated Scan	Time:	13:55:53					
Hieu Song Nguyenpham	Sequence#:	13					
EMITest 5.03.02							
	Enlighted, Inc. 15.247(d) / 15.209 Radiated Spurious Emiss 98231 Radiated Scan Hieu Song Nguyenpham	Enlighted, Inc.15.247(d) / 15.209 Radiated Spurious Emissions98231Date:Radiated ScanTime:Hieu Song NguyenphamSequence#:					

## Equipment Tested:

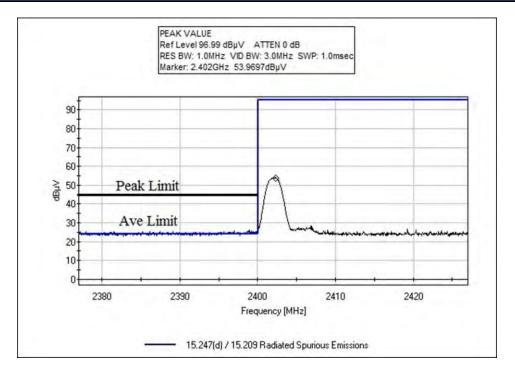
Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / Note	s:		
Band Edge			
Application: PuTTy ver Application: Smart RF S	sion 0.64 for 802.15.4 Studio 7 version 2.1.0 for B	Bluetooth	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure: 1	01.4kPa		
Transmitting operating f Gain of the antenna for f Gain of the antenna for f		1 2480MHz for 802.15.4	
The EUT is placed on S	tyrofoam on a table. It is se	et continuously transmitt	ing.
X axis- Direct to Antenn 802.15.4	na is the worst orthogonal		



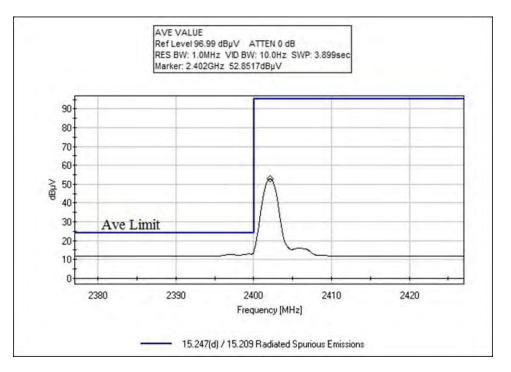
ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
	AN03114	Preamp	AMF-7D- 00101800-30- 10P	4/22/2015	4/22/2017
	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
	AN03302	Cable	32026-29094K- 29094K-72TC	1/29/2016	1/29/2018
	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	ANP06900	Cable	32022-29094K- 29094K-36TC	12/30/2015	12/30/2017
	AN03309	High Pass Filter	11SH10- 3000/T10000- O/O	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02694	Horn Antenna- ANSI C63.5 3m	AMFW-5F- 18002650-20- 10P	5/7/2015	5/7/2017
	AN03143	Cable	32022-29094K- 144TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06138	Cable	32022-29094K- 29094K-72TC	3/18/2015	3/18/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F- 12001800-20- 10P	5/6/2015	5/6/2017



## **Band Edge Plots**

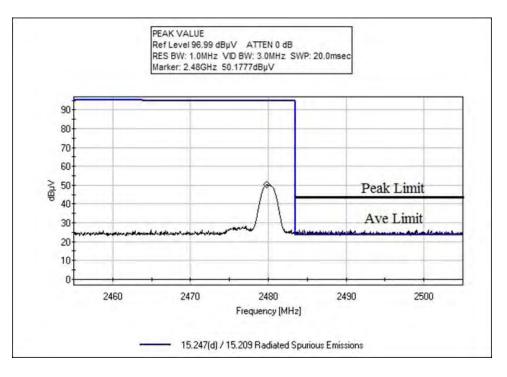


BLE, Low Channel

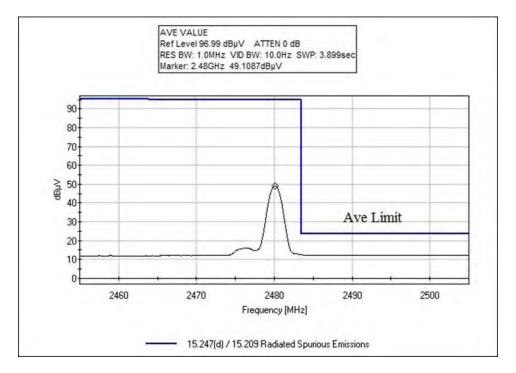


BLE, Low Channel



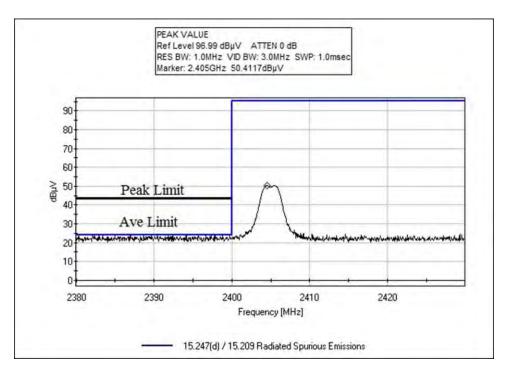


BLE, High Channel

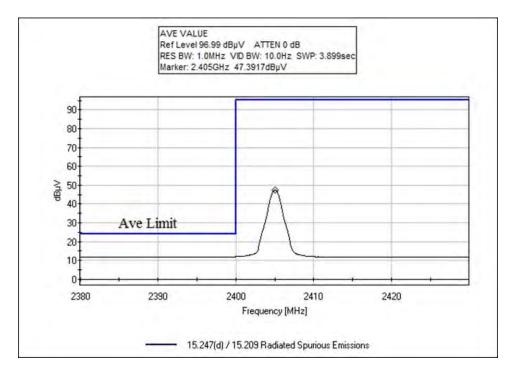


BLE, High Channel



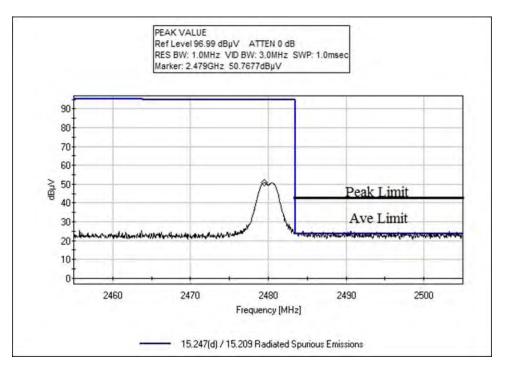


802.15.4, Low Channel

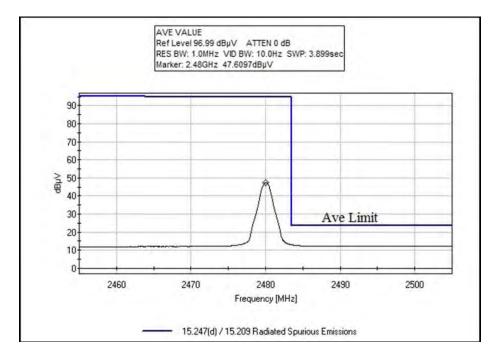


802.15.4, Low Channel





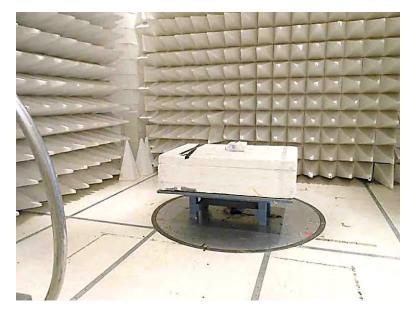
802.15.4, High Channel



802.15.4, High Channel



# **Test Setup Photos**



Configuration 1, 9kHz – 30MHz



Configuration 1, 9kHz – 30MHz





Configuration 1, 30MHz – 1GHz

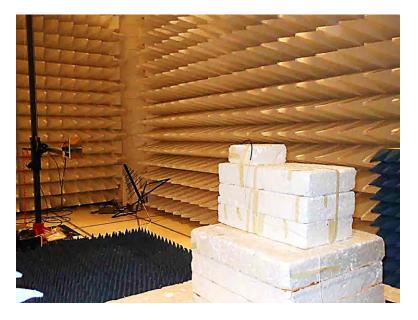


Configuration 1, 30MHz – 1GHz





Configuration 1, 1 – 12GHz



Configuration 1, 1 – 12GHz





Configuration 1, 12 – 18GHz



Configuration 1, 12 – 18GHz





X Axis

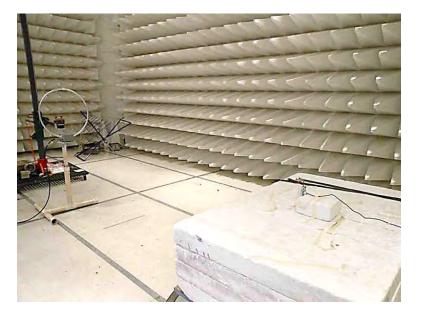


Y Axis



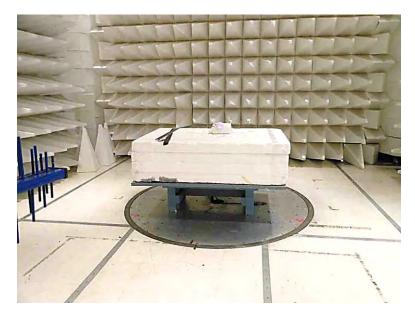


Configuration 2, 9kHz – 30MHz



Configuration 2, 9kHz – 30MHz





Configuration 2, 30MHz – 1GHz



Configuration 2, 30MHz – 1GHz



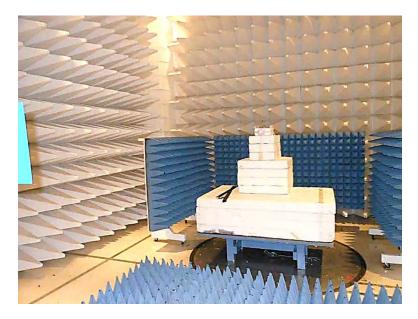


Configuration 2, 1 – 12GHz



Configuration 2, 1 – 12GHz



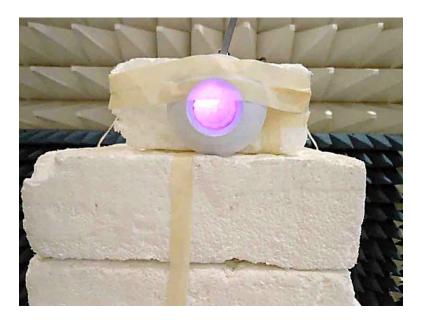


Configuration 2, 12 – 25GHz



Configuration 2, 12 – 25GHz





Configuration 2, X Axis



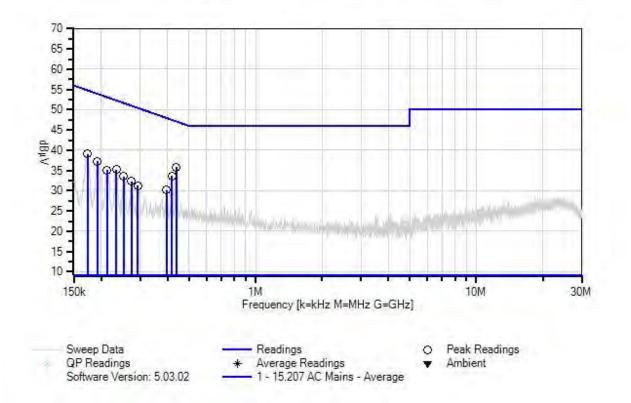
# 15.207 AC Conducted Emissions

# Test Setup / Conditions / Data

Test Location: Customer: Specification: Work Order #: Test Type: Tested By: Software:	CKC Laboratories, Inc. • 1120 Fe Enlighted, Inc. 15.207 AC Mains - Average 98231 Conducted Emissions Hieu Song Nguyenpham EMITest 5.03.02	Date:	4/28/2016 3:33:43 PM
Equipment Test			
<b>Device</b> Configuration 1	Manufacturer	Model #	S/N
Support Equipn	aont.		
Device	Manufacturer	Model #	S/N
Configuration 1			
Application: PuT Application: Sma Temperature: 20 Humidity: 45 % Atmospheric Pres	::150kHz to 30MHz Ty version 0.64 for 802.15.4 rt RF Studio 7 version 2.1.0 for Blu .1°C ssure: 101.4kPa	etooth	
Transmitting ope Gain of the anten	rating frequency= 2402, 2440 and 24 rating frequency= 2405, 2440 and 24 na for Bluetooth= 0dBi na for Zigbee= 0dBi		
-	d on Styrofoam on a table. It is set c le at Middle Channel	continuously transmitting	as intended.



Enlighted, Inc WO#: 98231 Sequence#: 80 Date: 4/28/2016 15.207 AC Mains - Average Test Lead: 120V 60Hz Line





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
Т3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/4/2015	3/4/2017
	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/4/2015	3/4/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
Т5	ANP05258	High Pass Filter	HE9615-150K- 50-720B	11/14/2014	11/14/2016

Measur	rement Data:	Re	eading lis	ted by ma	argin.			Test Lead	l: Line		
#	Freq	Rdng	T1 T5	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	437.245k	25.0	+9.9 +0.1	+0.0	+0.0	+0.8	+0.0	35.8	47.1	-11.3	Line
2	417.610k	23.0	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	33.7	47.5	-13.8	Line
3	173.269k	28.1	+9.9 +0.4	+0.0	+0.0	+0.7	+0.0	39.1	54.8	-15.7	Line
4	192.176k	26.5	+9.9 +0.2	+0.0	+0.0	+0.7	+0.0	37.3	53.9	-16.6	Line
5	233.627k	24.5	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	35.2	52.3	-17.1	Line
6	395.067k	19.5	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	30.2	48.0	-17.8	Line
7	212.538k	24.4	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	35.1	53.1	-18.0	Line
8	252.535k	22.8	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	33.5	51.7	-18.2	Line
9	273.624k	21.6	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	32.3	51.0	-18.7	Line
10	292.531k	20.5	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	31.2	50.5	-19.3	Line



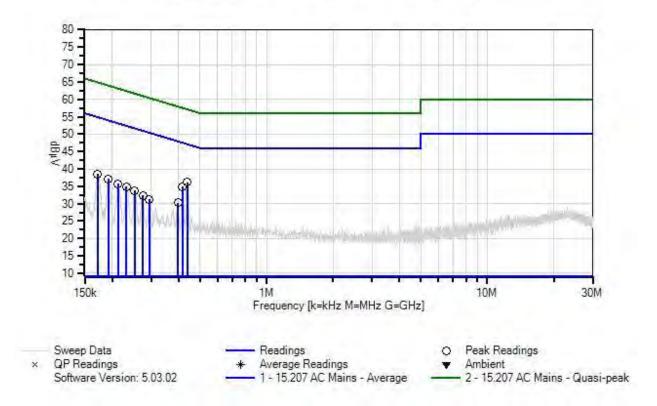
Test Location: Customer:	CKC Laboratories, Inc. • 1120 Fulton Place <b>Enlighted, Inc.</b>	• Fremont, C	A 94539 • (510) 249-1170
Specification: Work Order #:	15.207 AC Mains - Average 98231	Data	4/28/2016
Test Type:	Conducted Emissions		4/28/2010 3:47:07 PM
Tested By: Software:	Hieu Song Nguyenpham EMITest 5.03.02	Sequence#:	

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment	:		
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / No	otes:		
Conducted Emission			
Frequency Range:150	0kHz to 30MHz		
		luetooth	
	ng frequency= 2402, 2440 and ng frequency= 2405, 2440 and or Bluetooth= 0dBi or Zigbee= 0dBi		
The EUT is placed or <b>BLE on TX mode at</b>	n Styrofoam on a table. It is se Middle Channel	t continuously transmittir	ng as intended.



Enlighted, Inc WO#: 98231 Sequence#: 81 Date: 4/28/2016 15.207 AC Mains - Average Test Lead: 120V 60Hz Neutral





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
Т3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/4/2015	3/4/2017
T4	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/4/2015	3/4/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
Т5	ANP05258	High Pass Filter	HE9615-150K- 50-720B	11/14/2014	11/14/2016

Measur	rement Data:	Re	eading lis	ted by ma	argin.			Test Lead	l: Neutral		
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	437.246k	25.6	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	36.2	47.1	-10.9	Neutr
2	416.157k	24.3	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	34.9	47.5	-12.6	Neutr
3	171.816k	27.6	+9.9 +0.4	+0.0	+0.0	+0.6	+0.0	38.5	54.9	-16.4	Neutr
4	192.177k	26.4	+9.9 +0.2	+0.0	+0.0	+0.6	+0.0	37.1	53.9	-16.8	Neutr
5	212.539k	25.1	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	35.7	53.1	-17.4	Neutr
6	232.174k	24.3	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	34.9	52.4	-17.5	Neutr
7	397.250k	19.7	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	30.3	47.9	-17.6	Neutr
8	252.536k	23.1	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	33.7	51.7	-18.0	Neutr
9	275.806k	21.8	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	32.4	50.9	-18.5	Neutr
10	294.713k	20.7	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	31.3	50.4	-19.1	Neutr



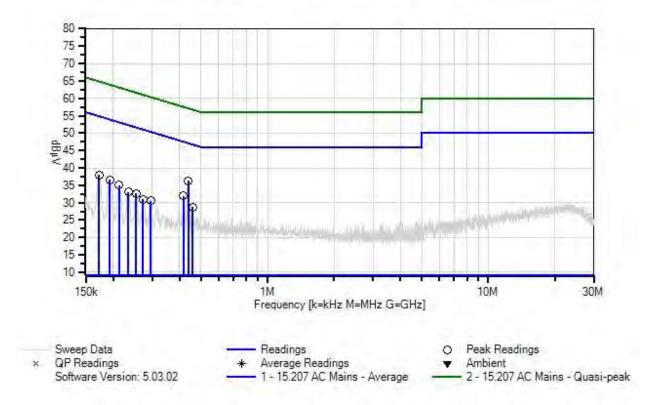
Test Location: Customer:	CKC Laboratories, Inc. • 1120 Fulton Place <b>Enlighted, Inc.</b>	• Fremont, C	A 94539 • (510) 249-1170
Specification:	15.207 AC Mains - Average		
Work Order #:	98231	Date:	4/28/2016
Test Type:	Conducted Emissions	Time:	3:53:40 PM
Tested By:	Hieu Song Nguyenpham	Sequence#:	82
Software:	EMITest 5.03.02	-	120V 60Hz

**Equipment Tested:** 

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment:			
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / No	tes:		
Conducted Emission			
Frequency Range:150	kHz to 30MHz		
	· 0.64.6 000 15.4		
	ersion 0.64 for 802.15.4	1 , 1	
Application: Smart RI	F Studio 7 version 2.1.0 for E	luetooth	
Temperature: 20.1°C			
Humidity: 45 %			
Atmospheric Pressure	: 101.4kPa		
1			
High Clock: 16MHz			
	g frequency= 2402, 2440 and		
	g frequency= 2405, 2440 and	2480MHz for 802.15.4	
Gain of the antenna fo	r Bluetooth= 0dBi		
Gain of the antenna fo	r Zigbee= 0dBi		
Method: ANSI C63.4	2014		
The EUT is placed on	Styrofoam on a table. It is se	et continuously transmitti	ng as intended.
802.15.4 on TX mode	e at Middle Channel		



Enlighted, Inc WO#: 98231 Sequence#: 82 Date: 4/28/2016 15.207 AC Mains - Average Test Lead: 120V 60Hz Line





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
Т3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/4/2015	3/4/2017
	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/4/2015	3/4/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
Т5	ANP05258	High Pass Filter	HE9615-150K- 50-720B	11/14/2014	11/14/2016

Measur	rement Data:	Re	eading lis	ted by ma	argin.			Test Lead	1: Line		
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV	dBµV	dB	Ant
1	437.246k	25.5	+9.9 +0.1	+0.0	+0.0	+0.8	+0.0	36.3	47.1	-10.8	Line
2	416.157k	21.2	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	31.9	47.5	-15.6	Line
3	172.543k	27.0	+9.9 +0.4	+0.0	+0.0	+0.7	+0.0	38.0	54.8	-16.8	Line
4	192.905k	25.8	+9.9 +0.2	+0.0	+0.0	+0.7	+0.0	36.6	53.9	-17.3	Line
5	456.880k	17.8	+9.9 +0.2	+0.0	+0.0	+0.8	+0.0	28.7	46.7	-18.0	Line
6	212.539k	24.3	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	35.0	53.1	-18.1	Line
7	253.990k	21.9	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	32.6	51.6	-19.0	Line
8	233.628k	22.4	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	33.1	52.3	-19.2	Line
9	296.168k	19.9	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	30.6	50.3	-19.7	Line
10	272.897k	20.3	+9.9 +0.1	+0.0	+0.0	+0.7	+0.0	31.0	51.0	-20.0	Line



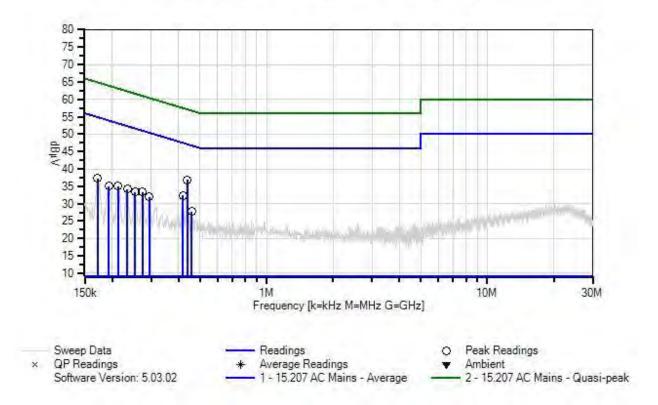
Test Location: Customer:	CKC Laboratories, Inc. • 1120 Fulton Place <b>Enlighted, Inc.</b>	• Fremont, C	A 94539 • (510) 249-1170
Specification: Work Order #:	15.207 AC Mains - Average 98231	Date:	4/28/2016
Test Type:	Conducted Emissions		3:58:49 PM
Tested By: Software:	Hieu Song Nguyenpham EMITest 5.03.02	Sequence#:	83 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			
Support Equipment	:		
Device	Manufacturer	Model #	S/N
Configuration 1			
Test Conditions / No	otes:		
Conducted Emission			
Frequency Range:150	0kHz to 30MHz		
		luetooth	
	ng frequency= 2402, 2440 and ng frequency= 2405, 2440 and or Bluetooth= 0dBi or Zigbee= 0dBi		
-	n Styrofoam on a table. It is se e at Middle Channel	et continuously transmittir	ng as intended.



Enlighted, Inc WO#: 98231 Sequence#: 83 Date: 4/28/2016 15.207 AC Mains - Average Test Lead: 120V 60Hz Neutral





ID	Asset #	Description	Model	<b>Calibration Date</b>	Cal Due Date
T1	ANP01211	Attenuator	23-10-34	3/31/2015	3/31/2017
T2	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
Т3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN00494	50uH LISN-Line Loss (dB)	3816/NM	3/4/2015	3/4/2017
T4	AN00494	50uH LISN-Return Loss (dB)	3816/NM	3/4/2015	3/4/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
Т5	ANP05258	High Pass Filter	HE9615-150K- 50-720B	11/14/2014	11/14/2016

Measur	rement Data:	Re	ading list	ted by ma	argin.			Test Lead	d: Neutral		
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	437.246k	26.3	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	36.9	47.1	-10.2	Neutr
2	416.884k	21.7	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	32.3	47.5	-15.2	Neutr
3	171.816k	26.4	+9.9 +0.4	+0.0	+0.0	+0.6	+0.0	37.3	54.9	-17.6	Neutr
4	273.625k	22.8	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	33.4	51.0	-17.6	Neutr
5	233.628k	23.6	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	34.2	52.3	-18.1	Neutr
6	212.539k	24.4	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	35.0	53.1	-18.1	Neutr
7	253.990k	22.7	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	33.3	51.6	-18.3	Neutr
8	294.713k	21.4	+9.9 +0.1	+0.0	+0.0	+0.6	+0.0	32.0	50.4	-18.4	Neutr
9	192.905k	24.3	+9.9 +0.2	+0.0	+0.0	+0.6	+0.0	35.0	53.9	-18.9	Neutr
10	456.880k	17.1	+9.9 +0.2	+0.0	+0.0	+0.6	+0.0	27.8	46.7	-18.9	Neutr



# Test Setup Photos





Page 141 of 143 Report No.: 98231-11



# 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 dB $\mu$ V/m, the spectrum analyzer reading in dB $\mu$ V was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on the limit value subtracting the corrected measured value; a negative margin represents a measurement less than the limit while a positive margin represents a measurement exceeding the limit.

SAMPLE CALCULATIONS				
	Meter reading	(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.