RF TEST REPORT

SIEMIC
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Report No.: FCC_RF_SL15011901-HID-001_DTS-Rev1.1
Supersede Report No.: FCC_RF_SL15011901-HID-001_DTS-Rev1.0

Applicant	HID Global Corporation
Product Name	Logical Access RFID Reader
Model No.	OMNIKEY 5127CK Mini
Test Standard	47CFR15.247 RSS 210 ISSUE 8,
Test Method	ANSI C63.10: 2013 558074 D01 DTS Meas Guidance V03r02
FCC ID	JQ6-OK5127CKMINI
IC ID	2236B-OK5127MINI
Date of test	February 3th-5th of 2015
Issue Date	04/01/2015
Test Result	☒ Pass ☐ Fail

Equipment complied with the specification	**[x]**
Equipment did not comply with the specification	**[ ]**

This Test Report is Issued Under the Authority of:

Osvaldo Casorla	Nima Molaei
Test Engineer	**Engineer Reviewer**

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Test result presented in this test report is applicable to the tested sample only

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, CA 95035

ilac-MRA
ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	EMC, RF/Wireless, Telecom, Safety
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

CONTENTS

1 REPORT REVISION HISTORY 4
2 EXECUTIVE SUMMARY 5
3 CUSTOMER INFORMATION 5
4 TEST SITE INFORMATION 5
5 MODIFICATION 5
6 EUT INFORMATION 6
6.1 EUT Description 6
6.2 Radio Description 6
6.3 EUT test modes/configuration Description 6
6.4 EUT Photos 7
6.5 EUT Test Setup Photos 8
7 SUPPORTING EQUIPMENT/SOFTWARE AND CABLING DESCRIPTION 9
7.1 Supporting Equipment 9
7.2 Cabling Description 9
7.3 Test Software Description 9
8 TEST SUMMARY 10
9 MEASUREMENT UNCERTAINTY 12
10 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS 13
10.1 Antenna Requirement 13
10.2 Conducted Emission Test Result 14
10.3 RF Conducted Measurement 17
10.4 Radiated Measurement 27
ANNEX A. TEST INSTRUMENT 32
ANNEX B. SIEMIC ACCREDITATION 33

1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_RF_SL15011901-HID-001_DTS	-	Original	03/19/2015
FCC_RF_SL15011901-HID-001_DTS-Rev1.0	Rev1.0	Updated equipment class on section 6.1	03/31/2015
FCC_RF_SL15011901-HID-001_DTS-Rev1.1	Rev1.1	Corrected output power	03/31/2015

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: HID Global Corporation
Product: Logical Access RFID Reader
Model: OMNIKEY 5127CK Mini

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	:	HID Global Corporation
Applicant Address	:	15370 Barranca Parkway, Irvine, CA 92618 USA
Manufacturer Name	:	HID Global Corporation
Manufacturer Address	:	15370 Barranca Parkway, Irvine, CA 92618 USA

4 Test site information

Lab performing tests	:	SIEMIC Laboratories
Lab Address	:	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	:	881796
IC Test Site No.	:	4842D-2
VCCI Test Site No.	:	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	:	Logical Access RFID Reader
Model No.	:	OMNIKEY 5127CK Mini
Trade Name	:	HID
Serial No.	:	Prototype
Input Power	:	5VDC/USB
Product SW/HW version	:	01:00 MAJOR:MINOR
Radio SW/HW version	:	V7.1.0
Test SW Version	:	N/A
RF power setting in TEST SW	:	+ 4dBm
Hardware version	:	N/A
Software version	:	N/A
Date of EUT received	:	January 02, 2015
Equipment Class/ Category	:	DXX, DCD, DTS
Clock Frequencies	:	N/A
Port/Connectors	:	N/A

6.2 Radio Description

Specifications for Radio:

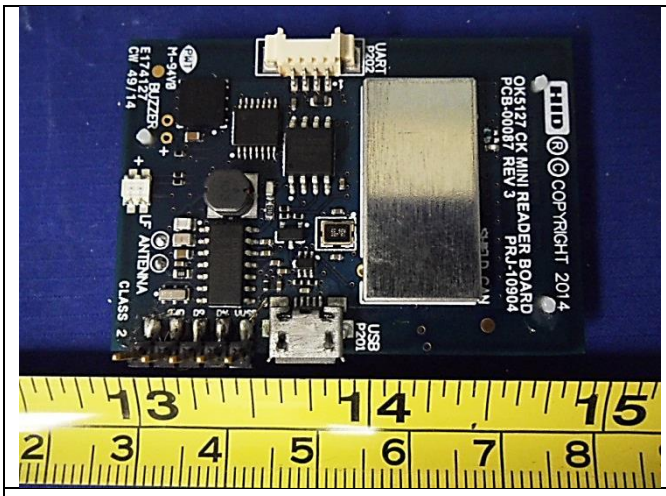
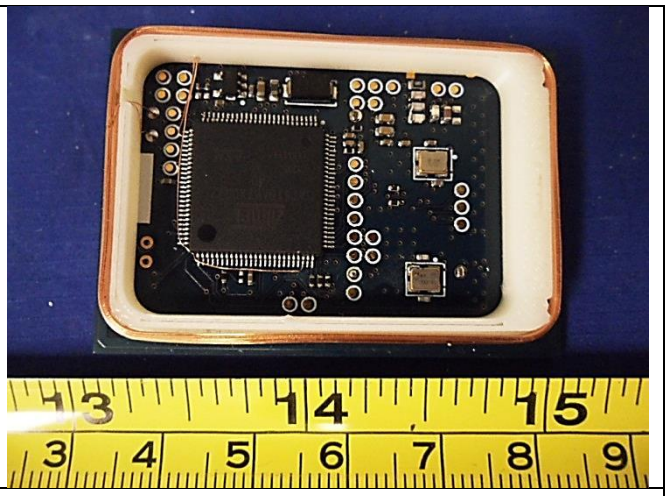
Radio Type	Bluetooth (LE)
Operating Frequency	2402MHz-2480MHz
Modulation	DSSS (LE)
Channel Spacing	2MHz (LE)
Antenna Type	Monopole antenna topology
Antenna Gain	3 dBi (2.4GHz)
Antenna Connector Type	N/A

Radio Type	RFID
Operating Frequency	125KHz, 13.56MHz
Modulation	ASK (125KHz), ASK (13.56MHz)
Channel Spacing	None
Antenna Type	Mag Integrated Loop Antenna
Antenna Gain	1 dBi
Antenna Connector Type	N/A

6.3 EUT test modes/configuration Description

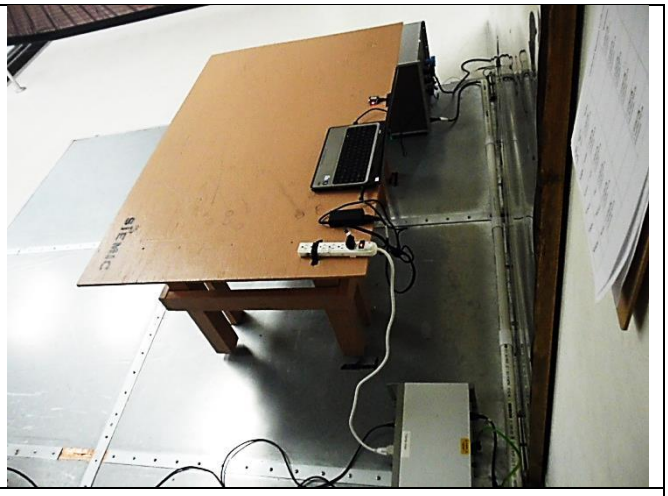
Mode	Note
Bluetooth	LE (GFSK)

6.4 EUT Photos

	
PCBA View 1	PCBA View 2

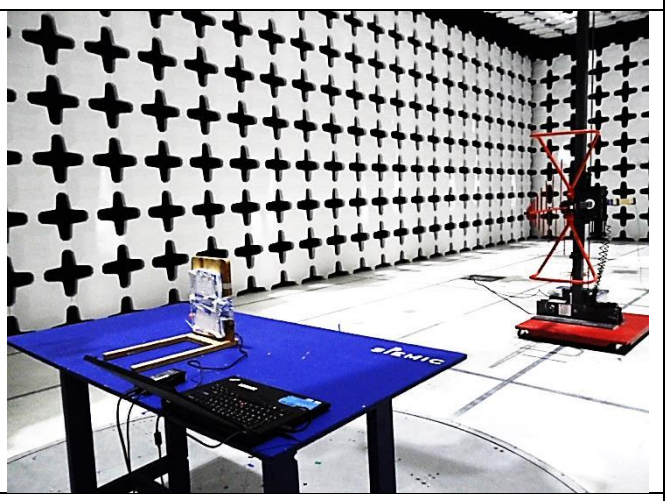
6.5 EUT Test Setup Photos

AC Line Conducted Emissions– Front View

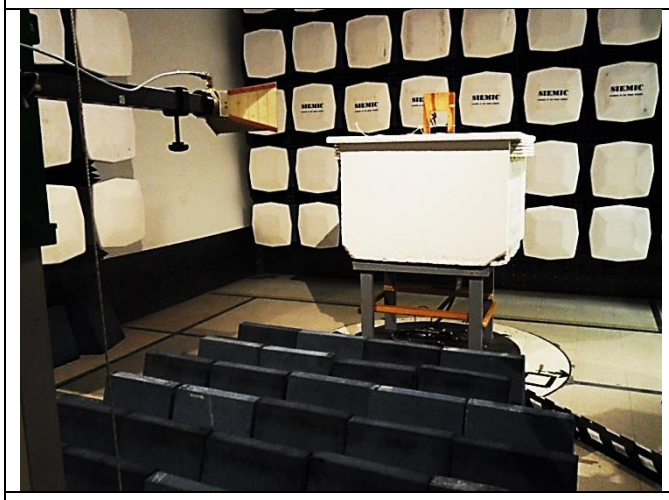


AC Line Conducted Emissions– Rear View

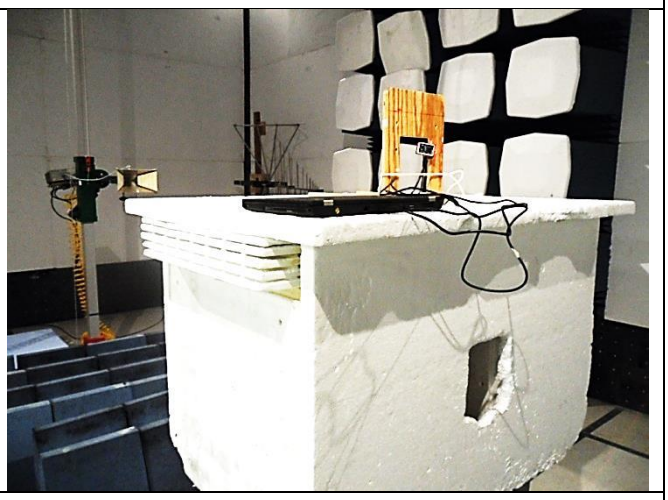
Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Index	Supporting Equipment Description	Model	Serial No.	Manu	Note
1	Laptop	Lenovo	R9-NP0D4 12/04	ThinkPad	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
USB	EUT	USB	Laptop	USB	2.0	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Putty.exe	Software allows setting the EUT to transmit at a test channel.

8 Test Summary

General Technical Requirement:

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.10 – 2013 558074 D01 DTS Meas. Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (2.2)		
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.10 – 2013 RSS Gen. 8.8	☒ Pass ☐ N/A
	IC	RSS Gen Issue 4, Nov 2014 (8.8)		
Remark	1. AC Line tests were performed on the support equipment's power adapter, laptop.			

DSSS requirement:

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Channel Separation	FCC	15.247 (a)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.1)	IC	-	
Occupied Bandwidth	FCC	15.247(a)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.1)	IC	RSS Gen 6.6	
6 dB Bandwidth	FCC	15.247(a)(2)	FCC	558074 D01 DTS Meas. Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.2)	IC	-	
Number of Hopping Channels	FCC	15.247(a)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.1)	IC	-	
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	ANSI C63.10 – 2013 558074 D01 DTS Meas. Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.5)	IC	-	
Time of Occupancy	FCC	15.247(a)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.1)	IC	-	
Output Power	FCC	15.247(b)	FCC	558074 D01 DTS Meas. Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.4)	IC	RSS Gen 6.12	
Receiver Spurious Emissions	FCC	-	FCC	-	☐Pass ☒ N/A
	IC	RSS Gen Issue 4, Nov 2014 (7.1)	IC	RSS Gen 7.1	
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.4)	IC	-	
Power Spectral Density	FCC	15.247(e)	FCC	558074 D01 DTS Meas. Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.3)	IC	-	
Hybrid System Requirement	FCC	15.247(f)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.3)	IC	-	
Hopping Capability	FCC	15.247(g)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.1)	IC	-	

Hopping Coordination Requirement	FCC	15.247(h)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 ISSUE 8, Dec 2010 (A8.1)	IC	-	
RF Exposure requirement	FCC	15.247(i)	FCC	-	☐ Pass ☒ N/A
	IC	RSS Gen Issue 4, Nov 2014 (3.2)	IC	-	
Remark	1. All measurement uncertainties do not take into consideration for all presented test results. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.				

9 Measurement Uncertainty

Test Item	Frequency Range	Description	Uncertainty
AC Conducted Emissions Voltage	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
6 dB & 26 dB & 99% Bandwidth	30MHz – 40GHz		±1.5dB
Maximum conducted output power	30MHz – 40GHz		±1.5dB
Maximum peak spectral density	30MHz – 40GHz		±1.5dB
Peak Excursion Ratio	30MHz – 40GHz		
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+4.3dB/-4.1dB

10 Measurements, examination and derived results

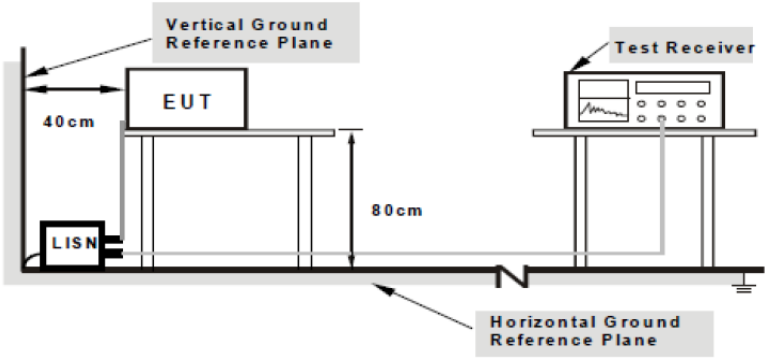
10.1 Antenna Requirement

Spec	Requirement	Applicable
§15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) Antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.	☒
Remark	The BT antenna is integral to the PCB board permanently to the device which meets the requirement (See Internal Photographs submitted as another Exhibit).	
Result	☒ PASS ☐ FAIL	

10.2 Conducted Emission Test Result

Conducted Emission Limit

Frequency ranges (MHz)	Limit (dBuV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

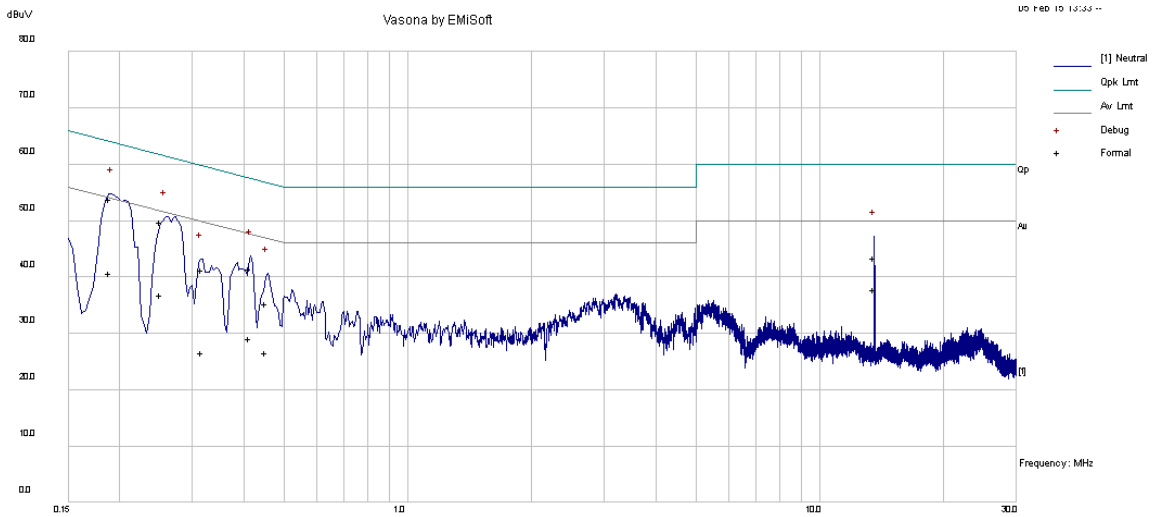
Spec	Item	Requirement	Applicable
§ 15.207, RSS 210 ISSUE 8 :2010(A8.1)	a)	For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits set in § 15.207, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). AC Line conducted emission within the band 150KHz to 30MHz	☒
Test Setup	 Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.	
Procedure	- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50µH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply.	
Remark	N/A	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	24.9°C	Result:	☒ Pass ☐ Fail
	Humidity (%):	28%		
	Atmospheric(mbar):	1014 mbar		
Mains Power:	120VAC, 60Hz			
Tested by:	Osvaldo Casorla			
Test Date:	02/05/2015			
Remarks:	Neutral			

Neutral Plot at V=120VAC, *f*=60Hz

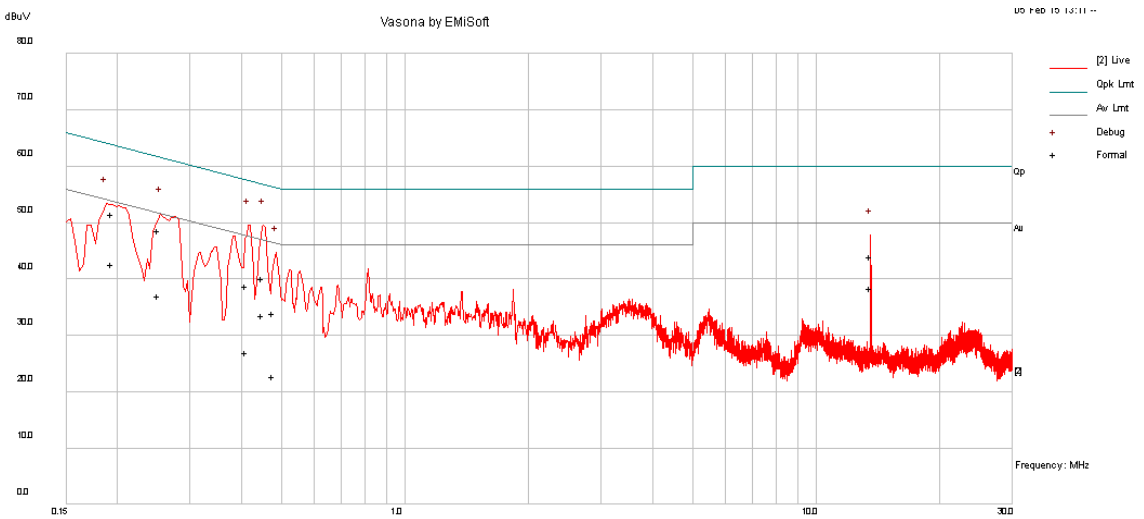


Neutral Measurements

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line/ Neutral	Limit dBuV	Margin dB	Pass /Fail
0.19	43.21	10.00	0.75	53.96	Quasi Peak	Neutral	64.08	-10.12	Pass
0.25	39.08	10.00	0.72	49.81	Quasi Peak	Neutral	61.70	-11.89	Pass
0.32	30.52	10.00	0.71	41.24	Quasi Peak	Neutral	59.79	-18.55	Pass
0.41	30.82	10.01	0.73	41.56	Quasi Peak	Neutral	57.59	-16.03	Pass
0.45	24.54	10.01	0.73	35.28	Quasi Peak	Neutral	56.85	-21.57	Pass
13.56	31.57	10.06	1.72	43.35	Quasi Peak	Neutral	60.00	-16.65	Pass
0.19	29.92	10.00	0.75	40.67	Average	Neutral	54.08	-13.41	Pass
0.25	26.10	10.00	0.72	36.83	Average	Neutral	51.70	-14.88	Pass
0.32	15.82	10.00	0.71	26.54	Average	Neutral	49.79	-23.25	Pass
0.41	18.35	10.01	0.73	29.09	Average	Neutral	47.59	-18.50	Pass
0.45	15.82	10.01	0.73	26.56	Average	Neutral	46.85	-20.29	Pass
13.56	25.99	10.06	1.72	37.77	Average	Neutral	50.00	-12.23	Pass

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	24.9°C	Result:	☒ Pass ☐ Fail
	Humidity (%):	28%		
	Atmospheric(mbar):	1014 mbar		
Mains Power:	120VAC, 60Hz			
Tested by:	Osvaldo Casorla			
Test Date:	02/05/2015			
Remarks:	Line			

Line Plot at V=120VAC, *f*=60Hz



Line Measurements

Frequency MHz	Raw dBµV	Cable Loss	Factors dB	Level dBµV	Measurement Type	Line/ Neutral	Limit dBµV	Margin dB	Pass /Fail
0.19	40.78	10.00	0.74	51.53	Quasi Peak	Line	63.86	-12.34	Pass
0.25	37.87	10.00	0.72	48.60	Quasi Peak	Line	61.70	-13.10	Pass
0.41	28.10	10.01	0.73	38.84	Quasi Peak	Line	57.61	-18.77	Pass
0.45	29.42	10.01	0.73	40.16	Quasi Peak	Line	56.86	-16.70	Pass
0.48	23.22	10.01	0.74	33.97	Quasi Peak	Line	56.35	-22.38	Pass
13.56	32.14	10.06	1.72	43.92	Quasi Peak	Line	60.00	-16.08	Pass
0.19	32.01	10.00	0.74	42.76	Average	Line	53.86	-11.11	Pass
0.25	26.32	10.00	0.72	37.05	Average	Line	51.70	-14.65	Pass
0.41	16.32	10.01	0.73	27.06	Average	Line	47.61	-20.55	Pass
0.45	22.83	10.01	0.73	33.57	Average	Line	46.86	-13.30	Pass
0.48	11.93	10.01	0.74	22.67	Average	Line	46.35	-23.67	Pass
13.56	26.54	10.06	1.72	38.32	Average	Line	50.00	-11.68	Pass

10.3 RF Conducted Measurement

10.3.1 6dB Bandwidth –DSSS (Bluetooth LE)

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247 RSS 210 ISSUE 8 :2010 (A8.2)	a)	For digitally modulated systems, the minimum 6dB bandwidth shall be at least 500 kHz.	☒

Test Setup				
Test Procedure	558074 D01 DTS Meas. Guidance v03r02, 8.1 DTS bandwidth 6dB Emission bandwidth measurement procedure - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 x RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. - Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.			
Test Date	02/05/2015	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	21°C 46% 1019mbar
Remark	NONE			
Result	☒ Pass ☐ Fail			

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
6 dB DTS Bandwidth	1-5% of DTS BW (≤100KHz)	3 x RBW	>EBW	Peak	Auto	Max hold	-

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

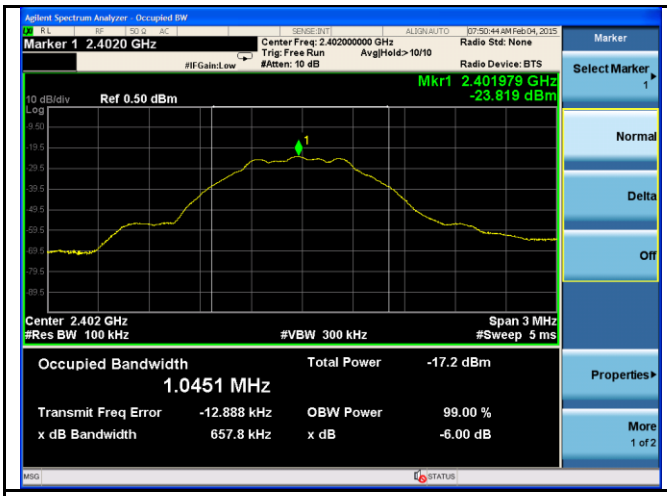
6dB Bandwidth Test Results:

Type	Freq (MHz)	Test mode	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	2402	Bluetooth LE	Low	0.6578	≥0.5	Pass
6dB BW	2442	Bluetooth LE	Mid	0.6560	≥0.5	Pass
6dB BW	2480	Bluetooth LE	High	0.6243	≥0.5	Pass

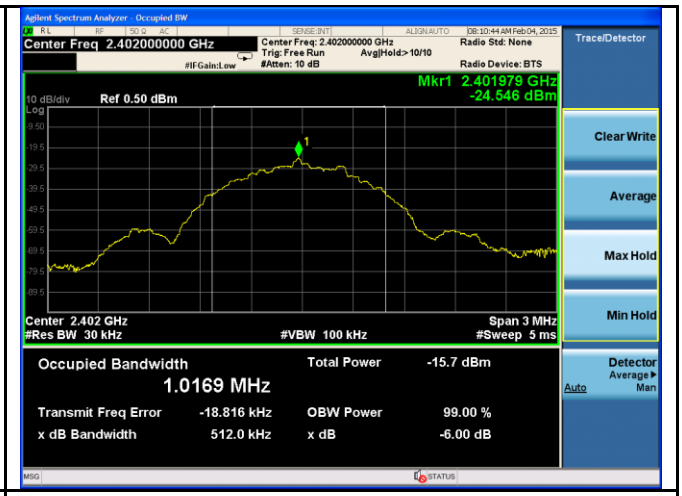
99% Bandwidth Test Results:

Type	Freq (MHz)	Test mode	CH	99% Bandwidth (MHz)
99% OBW	2402	Bluetooth LE	Low	1.0169
99% OBW	2442	Bluetooth LE	Mid	995.83
99% OBW	2480	Bluetooth LE	High	1.0127

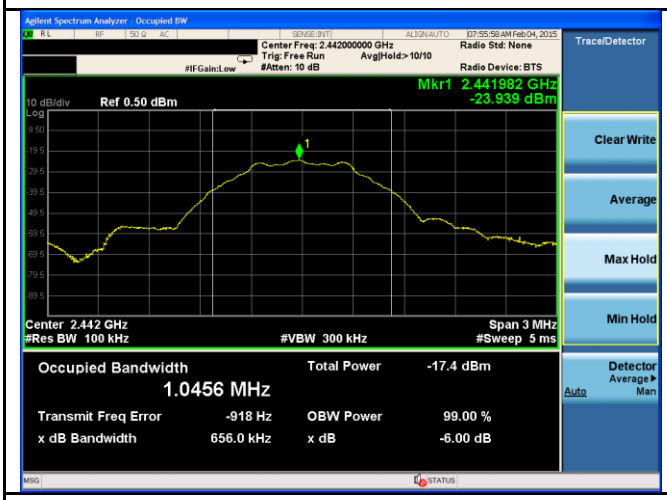
Test Plots



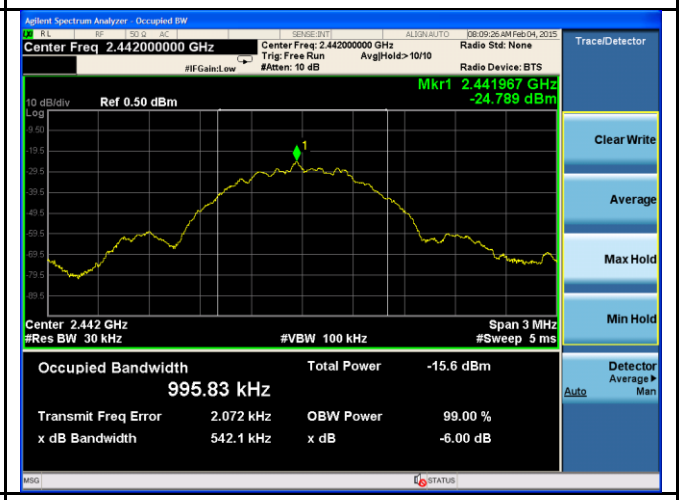
6dB BW-2402-BT LE



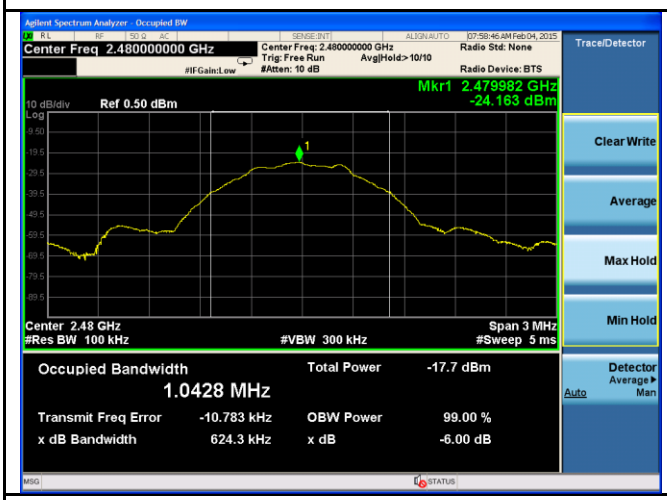
99% BW -2402- BT LE



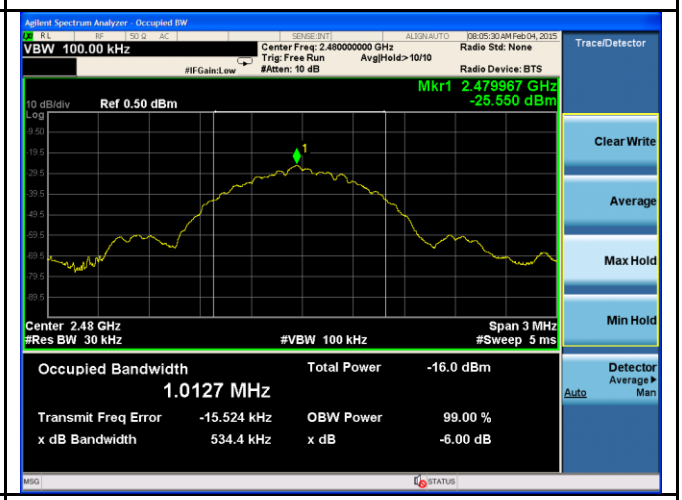
6dB BW-2442- BT LE



99% BW-2442-BT LE



6dB BW-2480- BT LE



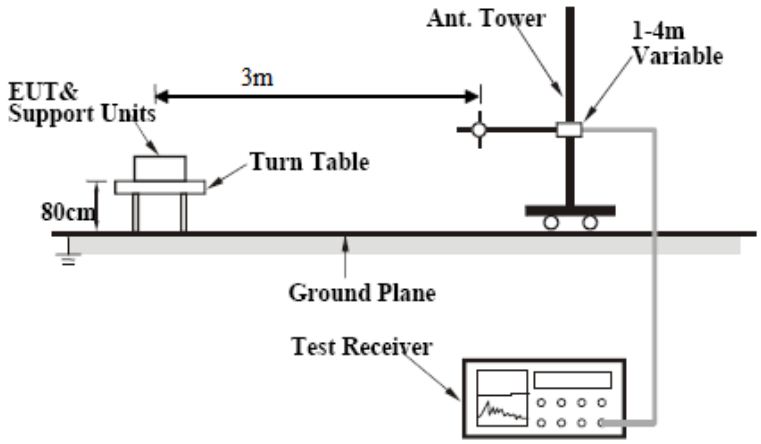
99% BW -2480- BT LE

10.3.2 Peak Spectral Density – DSSS (Bluetooth LE)

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(e), RSS 210 ISSUE 8 :2010 (A8.3)	a)	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.	☒

Test Setup



Test Procedure

558074 D01 DTS Meas. Guidance v03r02, 10.2 Method PKPSD (peak PSD)

Peak spectral density measurement procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
- Set the VBW ≥ 3 x RBW.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Date	02/05/2015	Environmental condition	Temperature 21°C Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	None		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
PSD	100KHz	≥3x RBW	1.5x DTS BW	Peak	Auto	Max hold	-

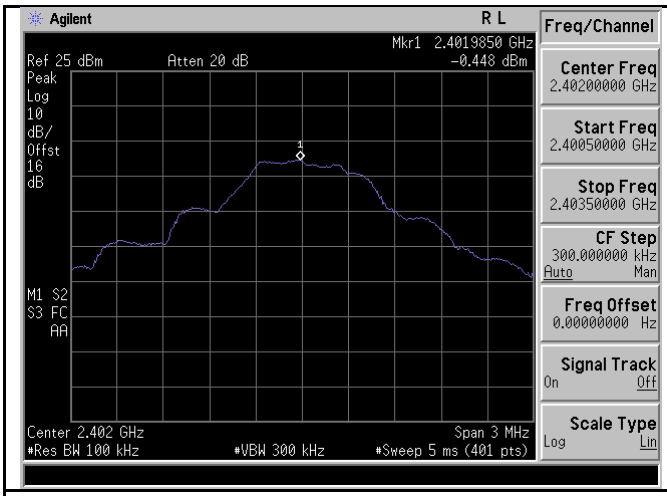
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

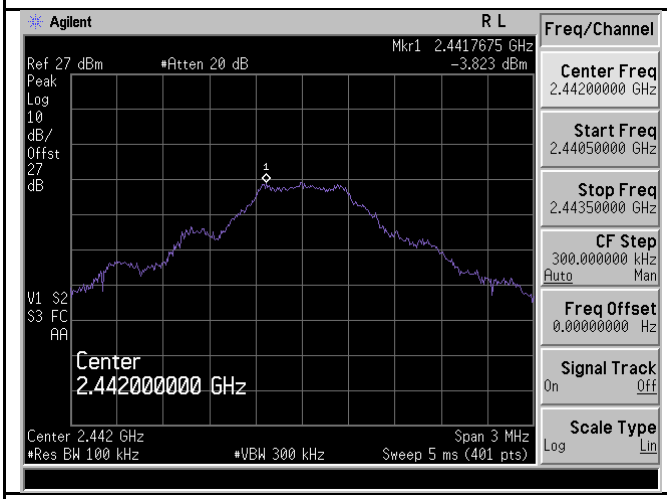
PSD Test Result

Type	Freq (MHz)	Test mode	CH	PSD (dBm/100kHz)	Limit (dBm/3kHz)	Result
Maximum PSD	2402	Bluetooth LE	Low	-0.448	≤8	Pass
Maximum PSD	2442	Bluetooth LE	Mid	-3.823	≤8	Pass
Maximum PSD	2480	Bluetooth LE	High	-0.455	≤8	Pass

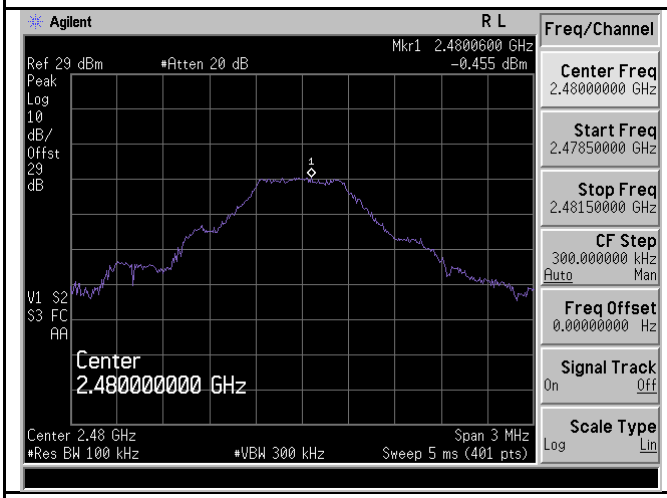
Test Plots



PSD BW-2402-BT LE	-



PSD-2442- BT LE	-

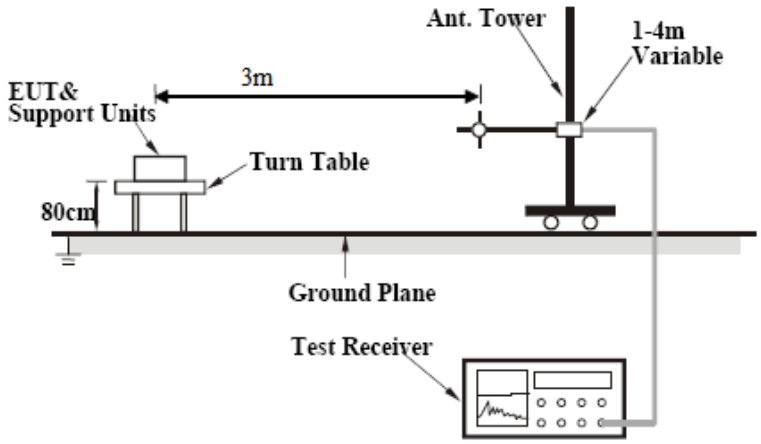


PSD BW-2480-BT LE	-

10.3.3 Peak Output Power – DSSS (Bluetooth LE)

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(b) (2) ,RSS 210 ISSUE 8 :2010 (A8.4)	a)	For systems using digital modulation in the 2400-2483.5MHz, and 5725-5850MHz bands: below 1 Watt.	☒
	b)	Power reduction (antenna gain > 6dBi)	☒

Test Setup	
Test Procedure	558074 D01 DTS Meas. Guidance v03r02, 9.1.2 Integrated band power method Maximum output power measurement procedure - Set the RBW = 1 MHz. - Set the VBW ≥ 3x RBW - Set the span ≥ 1.5 x DTS bandwidth. - Detector = peak. - Sweep time = auto couple. - Trace mode = max hold. - Allow trace to fully stabilize. - Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

Test Date	02/04/2015	Environmental condition	Temperature 21ºC Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	None		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes ☒ N/A

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
Peak output power	1MHz	≥3MHz	≥1.5 x DTS BW	Peak	Auto	Max hold	-

Peak Output Power Test Result

Type	Freq. (MHz)	Test mode	CH	Max field Strength (dBuV/m) @ 3m	Converted EIRP (dBm)	Antenna Gain (dBi)	Power (dBm)	Limit (dBm)	Result
Output power	2402	Bluetooth LE	Low	98.27	3.04	3	0.04	30	Pass
Output power	2442	Bluetooth LE	Mid	95.14	-0.09	3	-3.09	30	Pass
Output power	2480	Bluetooth LE	High	97.81	2.58	3	-0.42	30	Pass

10.3.4 Band Edge –DSSS (Bluetooth LE)

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS 210 ISSUE 8 :2010(A8.5)	d)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209 (a) is not required ☒ 20 dB down ☐ 30 dB down	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas. Guidance v03r02 Band Edge measurement procedure 1. Set the EUT to maximum power setting and enable the EUT transmit continuously. 2. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as a measured. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used. 3. Change modulation and channel bandwidth then repeat step 1 to 2. 4. Measured and record the results in the test report.		
Test Date	12/05/2014	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	None		
Result	☒ Pass ☐ Fail		

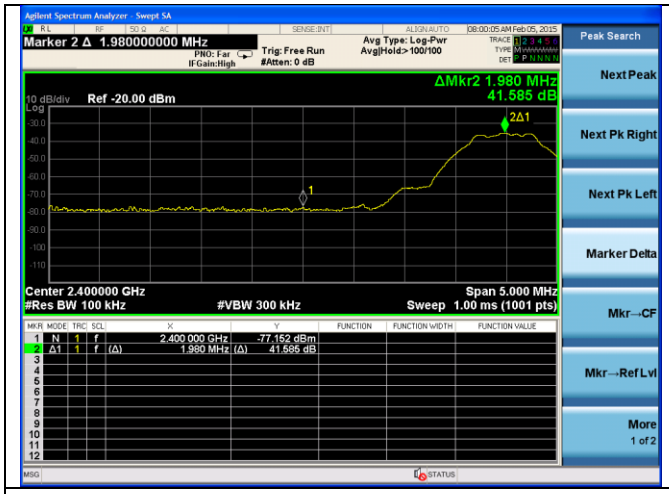
Equipment Setting

TEST	RBW	VBW	Detector	SWEEP	Trace	NOTES
Band Edge	100KHz	≥3 x RBW	Peak	Auto	Max hold	-

Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes ☐ N/A

Test Plots



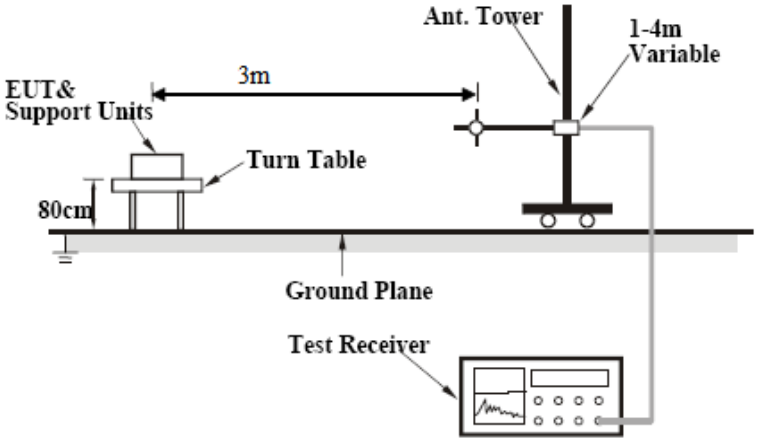
Band Edge-BT LE-Low

Band Edge-BT LE-High

10.4 Radiated Measurement

10.4.1 Radiated Measurement below 1GHz

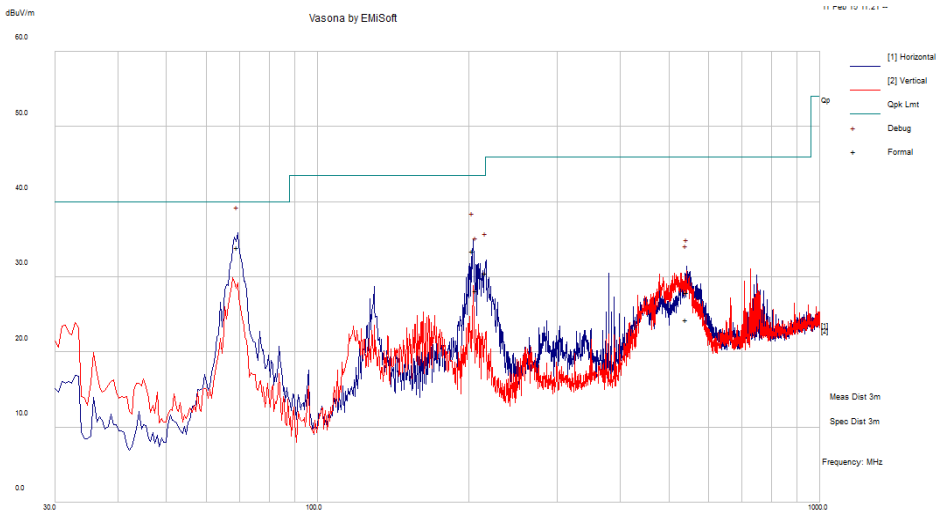
Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS 210 ISSUE 8 :2010(A8.5)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges **Frequency range (MHz)** / **Field Strength (uV/m)** 30 – 88 / 100 88 – 216 / 150 216 960 / 200 Above 960 / 500	☒
Test Setup			
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

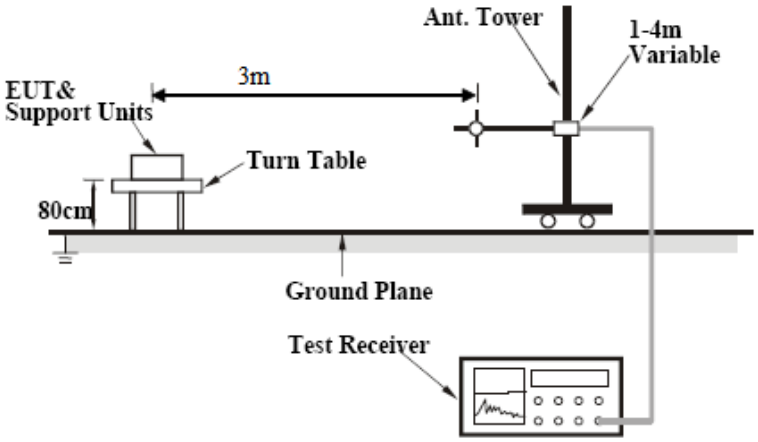
Test specification:	ANSI C63.10			
Environ Conditions:	Temp(°C):	22	Result:	Pass
	Humidity (%):	45		
	Atmospheric(mbar):	1021		
Mains Power:	110VAC, 60Hz			
Test Date:	02/03/2015			
Tested by:	Osvaldo Casorla			
Remarks:	None			
Frequency Range:	30 MHz – 1000 MHz			



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB
69.31	63.51	1.40	-30.96	33.94	Quasi Max	H	373.00	27.00	40.00	-6.06
203.86	59.15	2.52	-28.22	33.45	Quasi Max	H	109.00	70.00	43.50	-10.05
206.78	54.45	2.54	-28.83	28.16	Quasi Max	H	142.00	29.00	43.50	-15.34
216.19	56.88	2.60	-28.95	30.53	Quasi Max	H	101.00	29.00	46.00	-15.47
541.74	41.51	4.16	-21.37	24.31	Quasi Max	V	123.00	214.00	46.00	-21.69
543.74	45.13	4.16	-21.33	27.97	Quasi Max	H	194.00	93.00	46.00	-18.03

10.4.2 Radiated Spurious Emissions > 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS 210 ISSUE 8 :2010(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☒ 20 dB down ☐ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. An average measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	All peak detection results are under average limits. So formal scans are unnecessary.		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes ☐ N/A

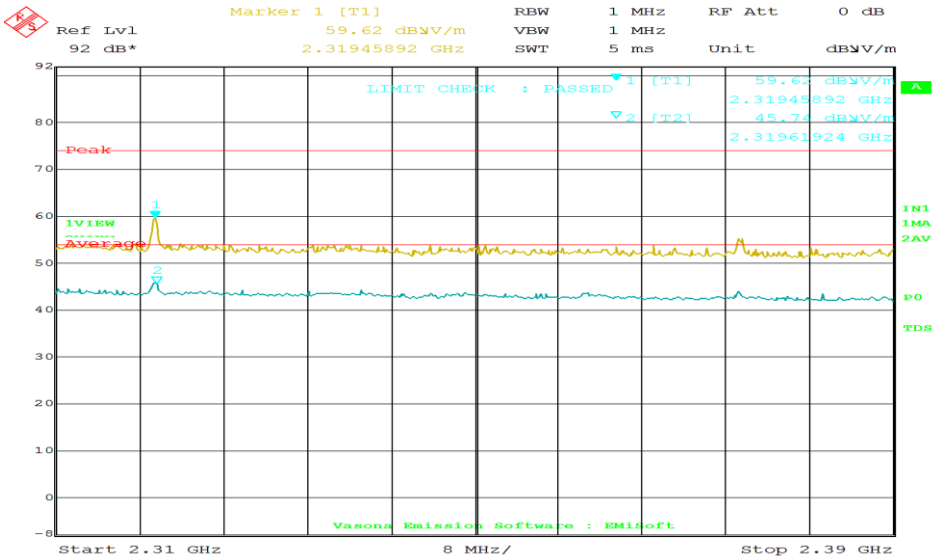
Test Result for Bluetooth-LE Mode

1GHz- 25GHz: (2402MHz)

Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
4030.59	40.31	5.86	12.09	58.26	Peak Max	H	278.00	166.00	74.00	-15.74	Pass
6067.89	44.05	7.09	10.90	62.04	Peak Max	H	193.00	34.00	74.00	-11.96	Pass
17455.57	39.79	12.91	10.26	62.97	Peak Max	V	233.00	269.00	74.00	-11.03	Pass
4030.59	27.38	5.86	12.09	45.33	Average Max	H	278.00	166.00	54.00	-8.67	Pass
6067.89	30.98	7.09	10.90	48.97	Average Max	H	193.00	34.00	54.00	-5.03	Pass
17455.57	26.95	12.91	10.26	50.13	Average Max	V	233.00	269.00	54.00	-3.87	Pass

Note: Both horizontal and vertical polarization were verified.

Lower Restricted band at 2390MHz



1GHz- 25GHz: (2442MHz)

Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
2497.04	41.65	5.09	10.03	56.77	Peak Max	H	124.00	290.00	74.00	-17.23	Pass
7326.60	44.34	8.51	7.91	60.76	Peak Max	V	100.00	287.00	74.00	-13.24	Pass
17642.90	40.64	13.00	10.54	64.19	Peak Max	V	276.00	322.00	74.00	-9.81	Pass
2497.04	26.42	5.09	10.03	41.55	Average Max	H	124.00	290.00	54.00	-12.45	Pass
7326.60	32.76	8.51	7.91	49.18	Average Max	V	100.00	287.00	54.00	-4.82	Pass
17642.90	27.28	13.00	10.54	50.83	Average Max	V	276.00	322.00	54.00	-3.17	Pass

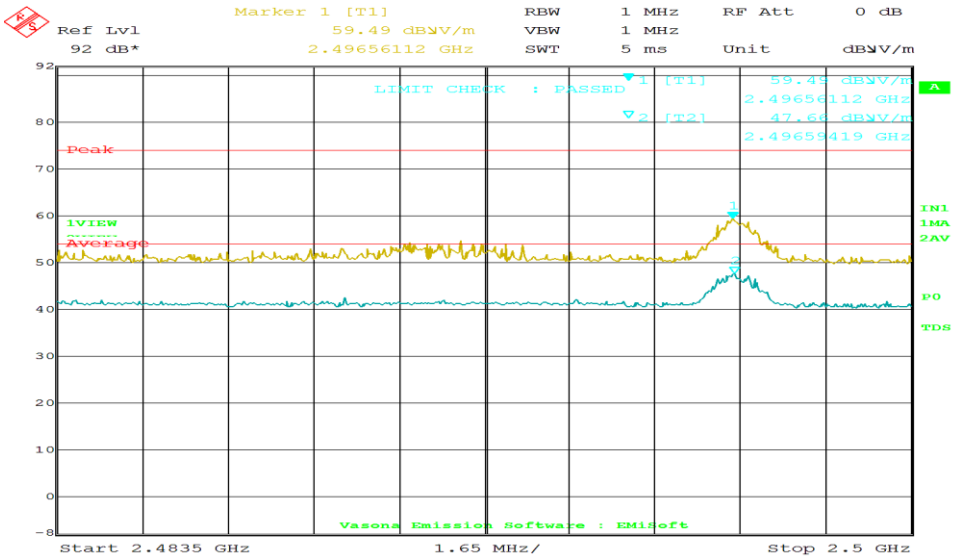
Note: Both horizontal and vertical polarization were verified.

1GHz- 25GHz: (2480MHz)

Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
4160.28	40.57	5.97	11.53	58.06	Peak Max	H	184.00	229.00	74.00	-15.94	Pass
7439.11	45.57	8.59	7.92	62.09	Peak Max	V	101.00	273.00	74.00	-11.91	Pass
14789.66	41.96	13.61	7.65	63.22	Peak Max	V	215.00	124.00	74.00	-10.78	Pass
4160.28	27.35	5.97	11.53	44.84	Average Max	H	184.00	229.00	54.00	-9.16	Pass
7439.11	33.77	8.59	7.92	50.29	Average Max	V	101.00	273.00	54.00	-3.71	Pass
14789.66	29.62	13.61	7.65	50.89	Average Max	V	215.00	124.00	54.00	-3.11	Pass

Note: Both horizontal and vertical polarization were verified.

Higher Restricted band at 2483.5MHz



Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Cycle	Cal Due	In use
Conducted Emissions					
R & S Receiver	ESHS10	830223/0009	1 Year	04/08/2015	☒
Spectrum Analyzer	FSIQ7	825555/013	1 Year	05/31/2015	☒
Schwarzbeck LISN	NNLK 8129	8129-190	1 Year	08/11/2015	☐
CHASE LISN	MN2050B	1018	1 Year	07/31/2015	☒
TLISN	ISN T800	30814	1 Year	08/08/2015	☐
Sekonic Hygro Hermograph	ST-50	HE01-000092	1 Year	05/25/2015	☒
Radiated Emissions					
R & S Receiver	ESL6	100178	1 Year	03/04/2015	☒
R & S Receiver	ESIB 40	100179	1 Year	05/24/2015	☐
ETS-Lingren Loop Antenna	6512	00049120	1 Year	05/13/2015	☒
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	1 Year	08/12/2015	☒
Horn Antenna (1-26.5GHz)	3115	10SL0059	1 Year	08/11/2015	☐
Horn Antenna (18-40 GHz)	AH-840	101013	1 Year	08/11/2015	☐
Pre-Amplifier (100kHz-7GHz)	LPA-6-30	11140711	1 Year	02/18/2015	☒
Microwave Preamplifier (18-40 GHz)	PA-840	181251	1 Year	02/12/2015	☐
10 Meters SAC	10M	N/A	1 Year	09/05/2015	☒
3 Meters SAC	3M	N/A	1 Year	03/06/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	1 Year	05/25/2015	☒

Test Software Version

Test Item	Vendor	Software	Version
Radiated Emission	EMISoft	EMISoft Vasona	V5.0
Conducted Emission	EMISoft	EMISoft Vasona	V5.0

Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1, A2, A3, A4, B1, B2, B3, B4, C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		**Radio & Telecommunications Terminal Equipment:** EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I, Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
HongKong OFCA		**(Phase II)** OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		**Radio:** Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		**Radio** : A1. Terminal equipment for purpose of calling **Telecom** : B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		**EMI:** KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI**EMS:** KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS
		Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68
		Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan FCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measuremet
Australia CAB Regocnition		**EMC:** AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4
		Radiocommunications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771
		Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016,AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2