

RF TEST REPORT



Report No.: FCC_RF_SL14031801-SLX-005-DSS_Rev1.0

Supersede Report No.: FCC_RF_SL14031801-SLX-005

Applicant	:	Navico Auckland Limited
Product Name	:	Silex Technology 802.11 bgn-BT mini PCIe module
Model No.	:	SX-PCEGN-BT
Test Standard	:	47 CFR 15.247 RSS 210 Issue8: 2010
Test Method	:	ANSI C63.4: 2009 RSS Gen FCC Public Notice DA 00-705
FCC ID	:	RAYWIFIBT1
IC ID	:	4697A-WIFIBT1
Dates of test	:	October 17, 2014 to October 31, 2014
Issue Date	:	12/12/2014
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:

Nima Molaei	David Zhang
Test Engineer	Engineer Reviewer

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



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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.



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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/RRR, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
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

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_RF_SL14031801-SLX-005	None	Original	12/08/2014
FCC_RF_SL14031801-SLX-005-DSS_Rev1.0	1.0	Correct OBW limit Separate DTS and DSS report	12/12/2014

2 Executive Summary

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

Company: Navico Auckland Limited
Product: Silex Technology 802.11 bgn-BT mini PCIe module
Model: SX-PCEGN-BT

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	:	Navico Auckland Limited
Applicant Address	:	44 Arrenway Drive Rosedale, Auckland, New Zealand 0632
Manufacturer Name	:	Silex Technology, Inc
Manufacturer Address	:	2-3-1 Hikaridai, Seika-cho, Kyoto 619-0237, Japan
Manufacturer Name	:	Advantech Co., Ltd.
Manufacturer Address	:	No. 1, Alley 20, Lane 26, Rueiguang Rd, Neihu District, Taipei 114, Taiwan, R.O.C

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	:	Mini-PCle 802.11 b/g/n WiFi with BT4.0 Combo
Model No.	:	SX-PCEGN-BT
Trade Name	:	Navico
Serial No.	:	N/A
Host Model No.	:	N/A
Input Power	:	3.3 VDC
Power Adapter Manu/Model	:	N/A
Power Adapter SN	:	N/A
Hardware version	:	N/A
Software version	:	N/A
Date of EUT received	:	10/20/2014
Equipment Class/ Category	:	DSS, DTS
Clock Frequencies	:	N/A
Port/Connectors	:	N/A

6.2 Radio Description

Spec for Radio -

Radio Type	802.11b	802.11g	802.11n-20M	802.11n-40M
Operating Frequency	2412-2462MHz	2412-2462MHz	2412-2462MHz	2422-2452MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	5MHz	40MHz
Number of Channels	11	11	11(2.4GH)	7(2.4GH)
Antenna Type	Embedded PCB antenna			
Antenna Gain	2.4GHz: 3.14 dBi			
Antenna Connector Type	U.FL connector			

Spec for BT Radio -

Radio Type	Bluetooth (Ver4.0+EDR)
Operating Frequency	2402MHz-2480MHz
Modulation	FHSS (BDR, EDR), DSSS (LE)
Channel Spacing	1MHz (BDR, EDR), 2MHz (LE)
Antenna Type	Embedded PCB antenna
Antenna Gain	2.4GHz: 3.14 dBi
Antenna Connector Type	U.FL connector

Channel List

Type		Channel No.	Frequency (MHz)	Available (Y/N)
802.11b/g/n-HT20	2412-2462	1	2412	Y
		2	2417	Y
		3	2422	Y
		4	2427	Y
		5	2432	Y
		6	2437	Y
		7	2442	Y
		8	2447	Y
		9	2452	Y
		10	2457	Y
		11	2462	Y
	2467-2472	12	2467	N
		13	2472	N

Type		Channel No.	Frequency (MHz)	Available (Y/N)
802.11n-HT40	2412-2462	1	2412	N
		2	2417	N
		3	2422	Y
		4	2427	Y
		5	2432	Y
		6	2437	Y
		7	2442	Y
		8	2447	Y
		9	2452	Y
		10	2457	N
		11	2462	N
	2467-2472	12	2467	N
		13	2472	N

Type		Channel No.	Frequency (MHz)	Available (Y/N)
Bluetooth	(BDR, EDR) 2402-2480MHz	0	2402	Y
		...	...	Y
		39	2441	Y
		...	...	Y
		78	2480	Y
	Blue Tooth (LE)	0	2402	Y
		...	...	Y
		19	2440	Y
		...	...	Y
		39	2480	Y

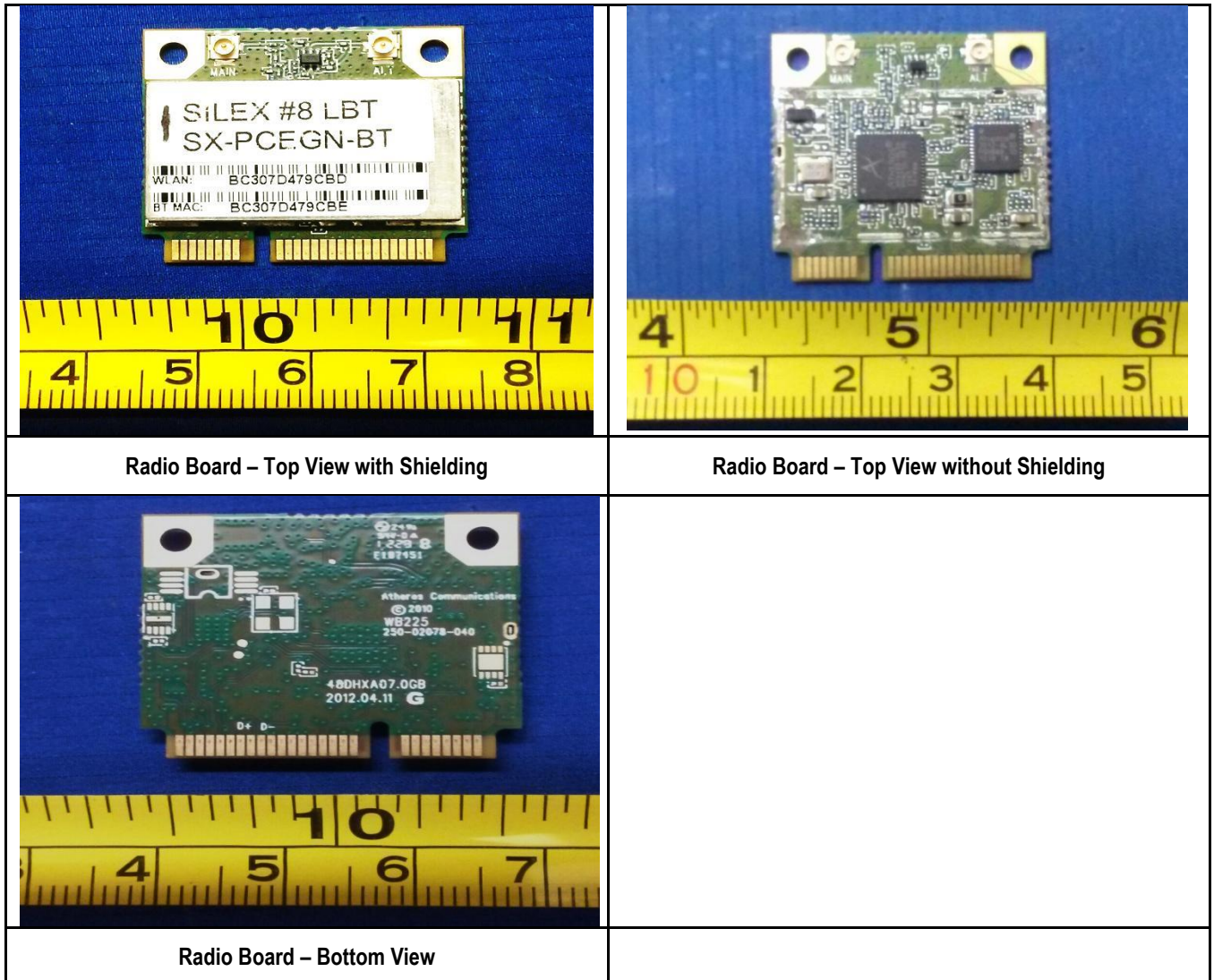
6.3 EUT test modes/configuration Description

Mode	Note
Bluetooth	BDR (GFSK)
Bluetooth	EDR (8-DPSK)

EUT Power level setting

Mode	Frequency (MHz)	ART Power setting
802.11-b	2412	16.5
802.11-b	2437	16.5
802.11-b	2462	16.5
802.11-g	2412	14.5
802.11-g	2437	16.5
802.11-g	2462	13
802.11-n-20	2412	13.5
802.11-n-20	2437	16
802.11-n-20	2462	12
802.11-n-40	2422	11
802.11-n-40	2437	13
802.11-n-40	2452	10

6.4 EUT Photos



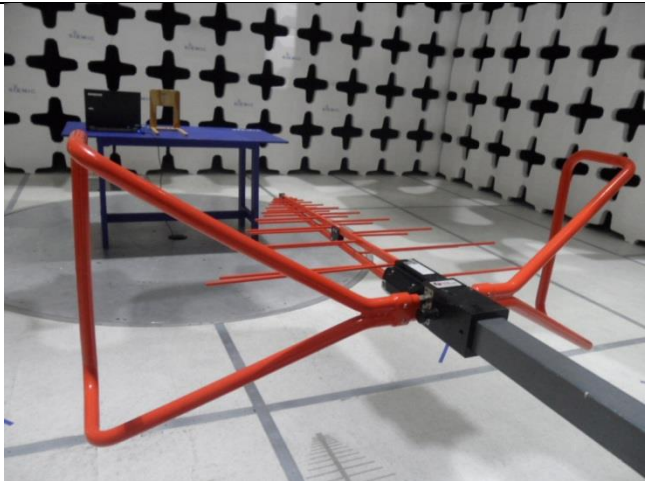
6.5 EUT Test Setup Photos



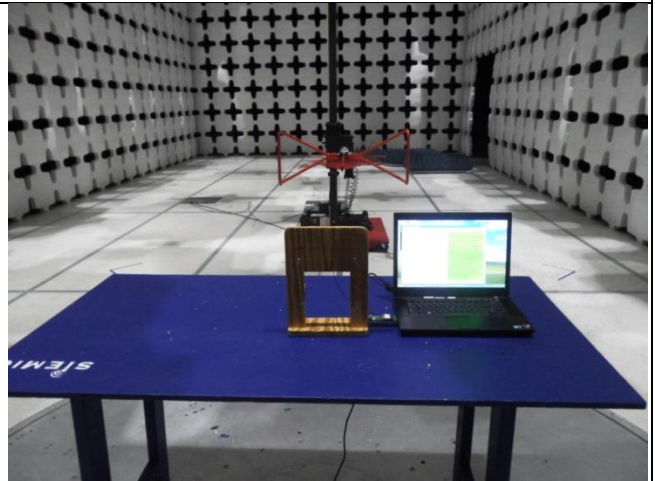
AC Line Conducted Emissions – Front View



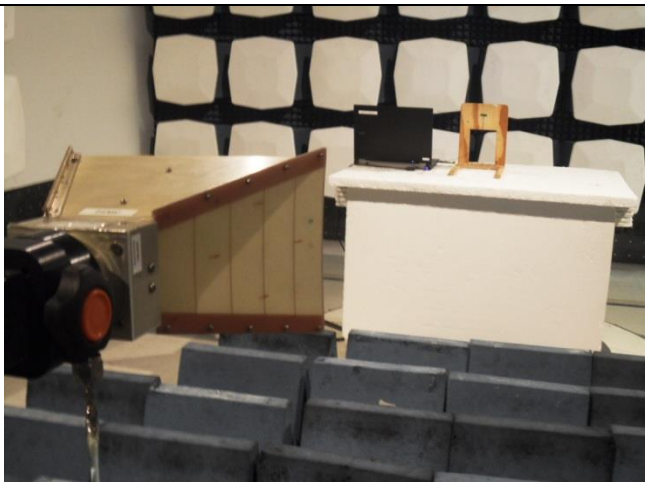
AC Line Conducted Emissions – Rear View



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

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	Lattitude E6500	N/A	Dell	-
2					

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
-	-	-	-	-	-	-	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	BtUSBTool/ART	Set the EUT to different modulation and channels

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC	15.205	FCC	ANSI C63.4 – 2009 Public Notice DA 00-705	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.4 – 2009	☒ Pass ☐ N/A

DSS Band Requirement

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Channel Separation	FCC	15.247 (a)(1)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS210 (A8.1)	IC	-	
20dB Occupied Bandwidth	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS Gen(6.6)	IC	-	
Bandwidth	FCC	15.247(a)(2)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS210 (A8.2)	IC	-	
Number of Hopping Channels	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS210(A8.1)	IC	-	
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS210(A8.5)	IC	-	
Time of Occupancy	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS210(A8.1)	IC	-	
Output Power	FCC	15.247(b)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS210 (A8.4)	IC	-	
Receiver Spurious Emissions	FCC	15.247(d)	FCC	-	☒ Pass ☐ N/A
	IC	RSS Gen (7.1)	IC	RSS Gen (7.1)	
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS210(A8.4)	IC	-	
Power Spectral Density	FCC	15.247(e)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS210(A8.3)	IC	-	
Hybrid System Requirement	FCC	15.247(f)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS210(A8.3)	IC	-	
Hopping Capability	FCC	15.247(g)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS210(A8.1)	IC	-	
Hopping Coordination Requirement	FCC	15.247(h)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS210(A8.1)	IC	-	
RF Exposure requirement	FCC	15.247(i)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS Gen(3.2)	IC	-	
Remark	1. All measurement uncertainties are not taken into consideration for all presented test result. 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

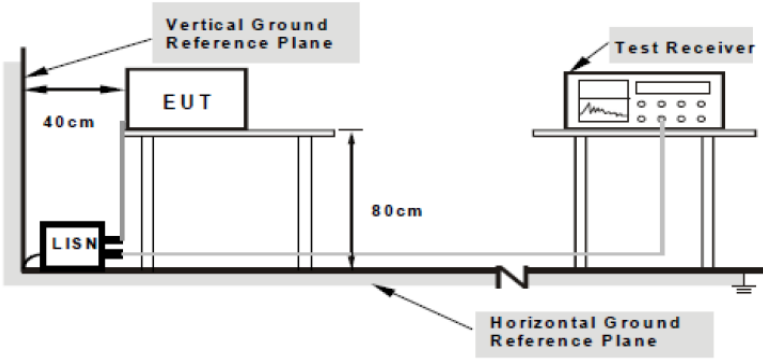
Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious 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 Conducted Emissions

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

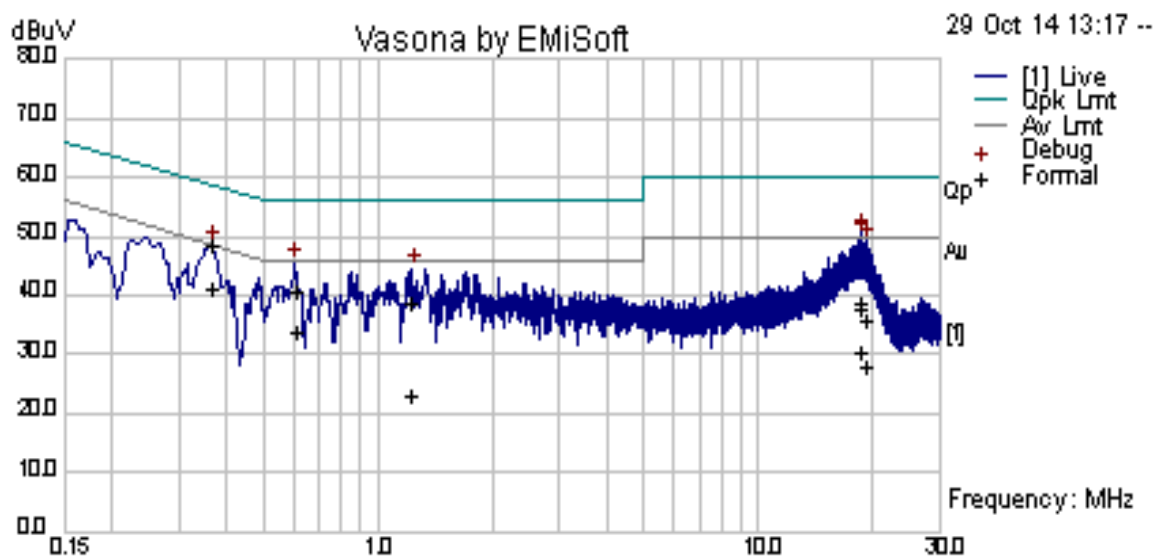
Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	☒
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	EUT tested with AC 110V 60Hz		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Conducted Emission Test Results (Live)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	22	Result:	☒ Pass ☐ Fail
	Humidity (%):	40		
	Atmospheric(mbar):	1022		
Mains Power:	110Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	10/29/2014			
Remarks	Line			

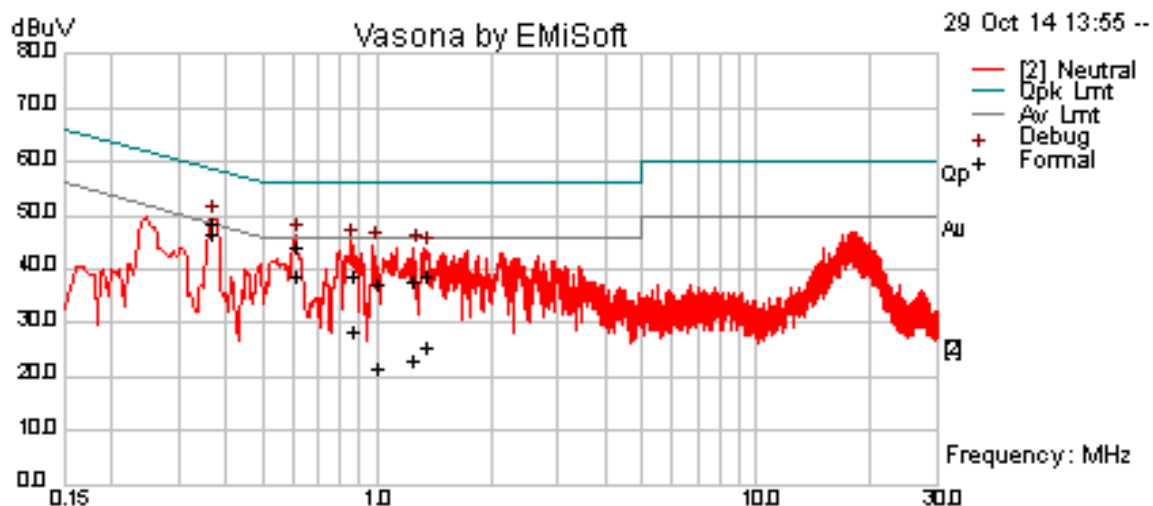


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
18.54	25.34	10.07	2.15	37.55	Quasi Peak	Line	60.00	-22.45	Pass
18.43	26.43	10.07	2.14	38.63	Quasi Peak	Line	60.00	-21.37	Pass
0.37	37.96	10.01	0.72	48.68	Quasi Peak	Line	58.61	-9.93	Pass
0.61	29.83	10.01	0.75	40.59	Quasi Peak	Line	56.00	-15.41	Pass
19.19	23.67	10.07	2.20	35.94	Quasi Peak	Line	60.00	-24.06	Pass
1.23	27.71	10.02	0.82	38.55	Quasi Peak	Line	56.00	-17.45	Pass
18.54	18.13	10.07	2.15	30.34	Average	Line	50.00	-19.66	Pass
18.43	18.04	10.07	2.14	30.24	Average	Line	50.00	-19.76	Pass
0.37	30.61	10.01	0.72	41.34	Average	Line	48.61	-7.27	Pass
0.61	23.15	10.01	0.75	33.91	Average	Line	46.00	-12.09	Pass
19.19	15.59	10.07	2.20	27.86	Average	Line	50.00	-22.14	Pass
1.23	12.24	10.02	0.82	23.08	Average	Line	46.00	-22.92	Pass

Conducted Emission Test Results (Neutral)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	22	Result:	☒ Pass ☐ Fail
	Humidity (%):	40		
	Atmospheric(mbar):	1022		
Mains Power:	110Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	10/29/2014			
Remarks	Neutral			



Neutral Line Plot @ 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.36	37.91	10.01	0.72	48.64	Quasi Peak	Neutral	58.62	-9.98	Pass
0.61	33.29	10.01	0.75	44.05	Quasi Peak	Neutral	56.00	-11.95	Pass
0.86	28.08	10.01	0.72	38.82	Quasi Peak	Neutral	56.00	-17.18	Pass
0.99	26.72	10.02	0.78	37.52	Quasi Peak	Neutral	56.00	-18.48	Pass
1.24	26.89	10.02	0.82	37.73	Quasi Peak	Neutral	56.00	-18.27	Pass
1.35	27.80	10.02	0.85	38.66	Quasi Peak	Neutral	56.00	-17.34	Pass
0.36	35.79	10.01	0.72	46.52	Average	Neutral	48.62	-2.10	Pass
0.61	28.00	10.01	0.75	38.76	Average	Neutral	46.00	-7.24	Pass
0.86	17.77	10.01	0.72	28.51	Average	Neutral	46.00	-17.49	Pass
0.99	10.98	10.02	0.78	21.77	Average	Neutral	46.00	-24.23	Pass
1.24	12.02	10.02	0.82	22.86	Average	Neutral	46.00	-23.14	Pass
1.35	14.45	10.02	0.85	25.31	Average	Neutral	46.00	-20.69	Pass

Note: The results above show only the worst case.

10.2 Channel Separation (Bluetooth BDR/EDR)

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 (e) RSS-210 (A2.6)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or 2/3 of 20 dB bandwidth of the hopping channel, whichever is greater.	☒
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	10/23/2014	Environmental condition Temperature 23oC Relative Humidity 47% Atmospheric Pressure 1019mbar
Remark	-	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Configuration : Bluetooth Mode , Basic Data Rate, 1Mbps

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	2/3 20dB Bandwidth (MHz)	Pass/Fail
Low	2402	0.999	0.666	Pass
Mid	2441	0.987	0.658	Pass
High	2480	1.002	0.662	Pass

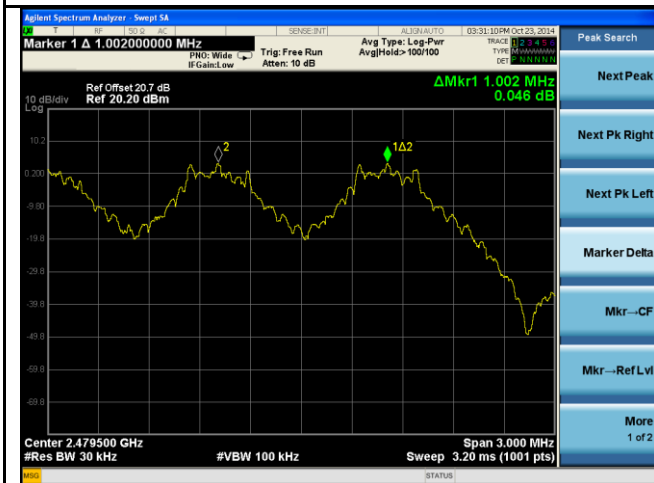
Configuration : Bluetooth Mode , EDR 3Mbps

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	2/3 20dB Bandwidth (MHz)	Pass/Fail
Low	2402	1.002	0.791	Pass
Mid	2441	1.996	0.791	Pass
High	2480	1.993	0.697	Pass

Channel Separation Test Plot (Bluetooth BDR/EDR)



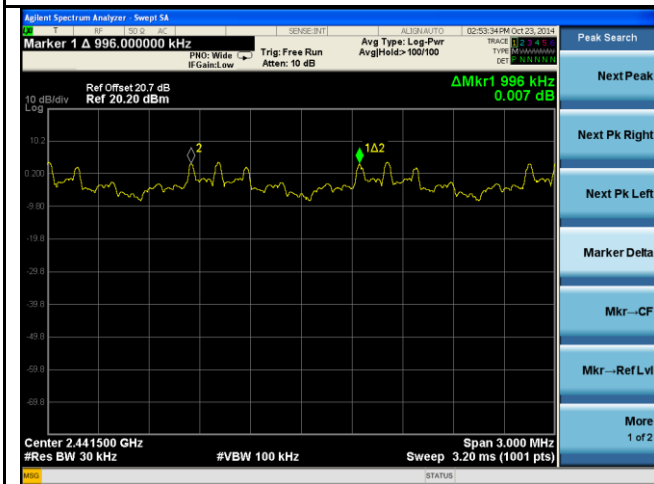
Channel Separation-Low Channel-Normal Mode



Channel Separation-Mid Channel-Normal Mode



Channel Separation-High Channel-Normal Mode



Channel Separation-Low Channel-EDR Mode



Channel Separation-Mid Channel-EDR Mode

Channel Separation-High Channel-EDR Mode

10.3 20dB Occupied Bandwidth (Bluetooth BDR/EDR)

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS-210 (A2.6)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 2/3 of 20 dB bandwidth of the hopping channel, whichever is greater.	☒
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	10/20/2014	Environmental condition Temperature 23oC Relative Humidity 47% Atmospheric Pressure 1019mbar
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

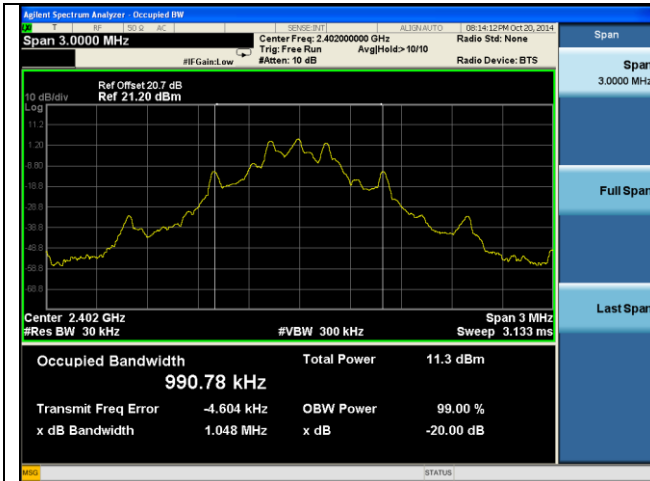
Configuration : Bluetooth mode , Basic Rate

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)	2/3 20dB Bandwidth (MHz)
Low	2402	1.048	0.698
Mid	2441	1.046	0.697
High	2480	1.047	0.697

Configuration : Bluetooth mode , EDR mode

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)	2/3 20dB Bandwidth (MHz)
Low	2402	1.187	0.791
Mid	2441	1.187	0.791
High	2480	1.046	0.697

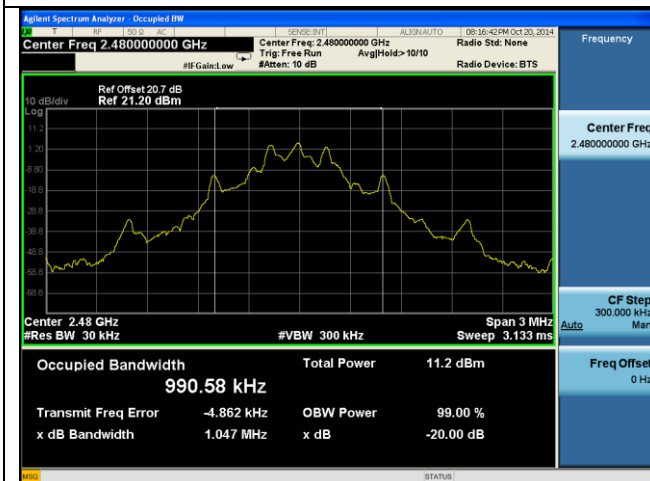
20dB Bandwidth Test Plots(Bluetooth BDR, EDR)



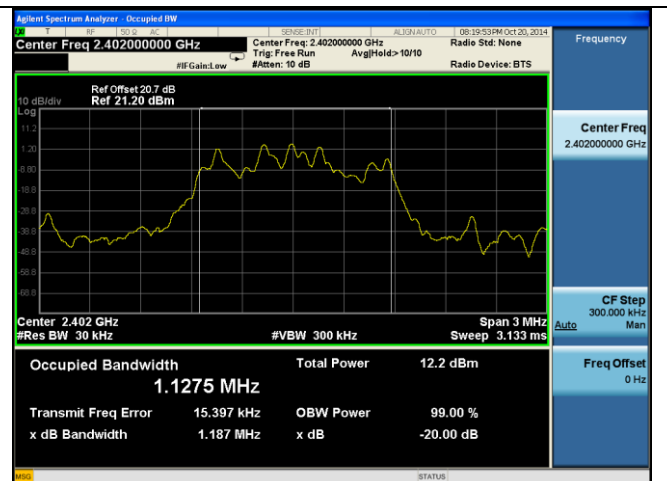
20dB BW -Bluetooth BDR 2402MHz



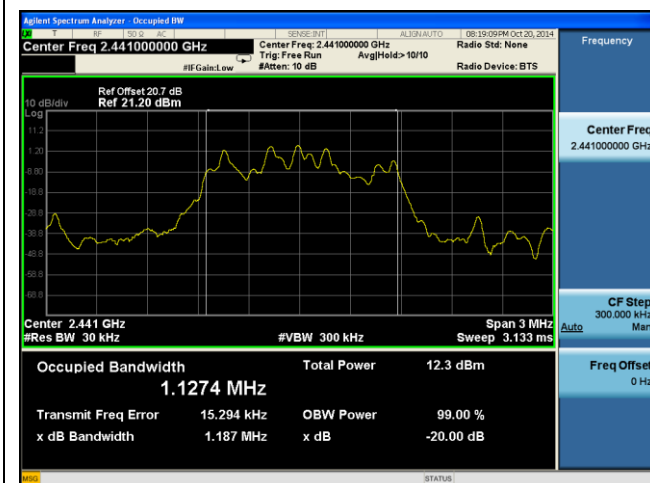
20dB BW -Bluetooth BDR 2441MHz



20dB BW -Bluetooth BDR 2480MHz



20dB BW -Bluetooth EDR 2402MHz



20dB BW -Bluetooth EDR 2441MHz



20dB BW -Bluetooth EDR 2480MHz

10.4 Number of Hopping Channel (Bluetooth BDR/EDR)

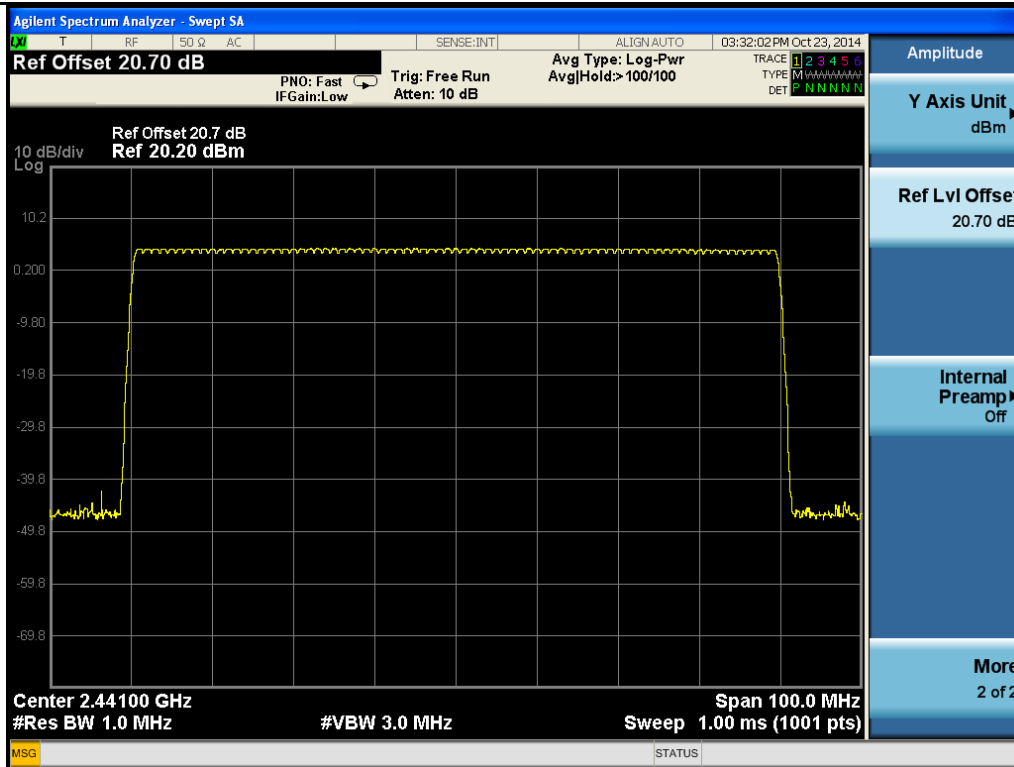
Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS-210 (A2.6)	Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.	☒
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal. 3. RBW=100 KHz, VBW > RBW	
Test Date	10/23/2014	Environmental condition Temperature 23oC Relative Humidity 47% Atmospheric Pressure 1019mbar
Remark	-	
Result	☒ Pass ☐ Fail	

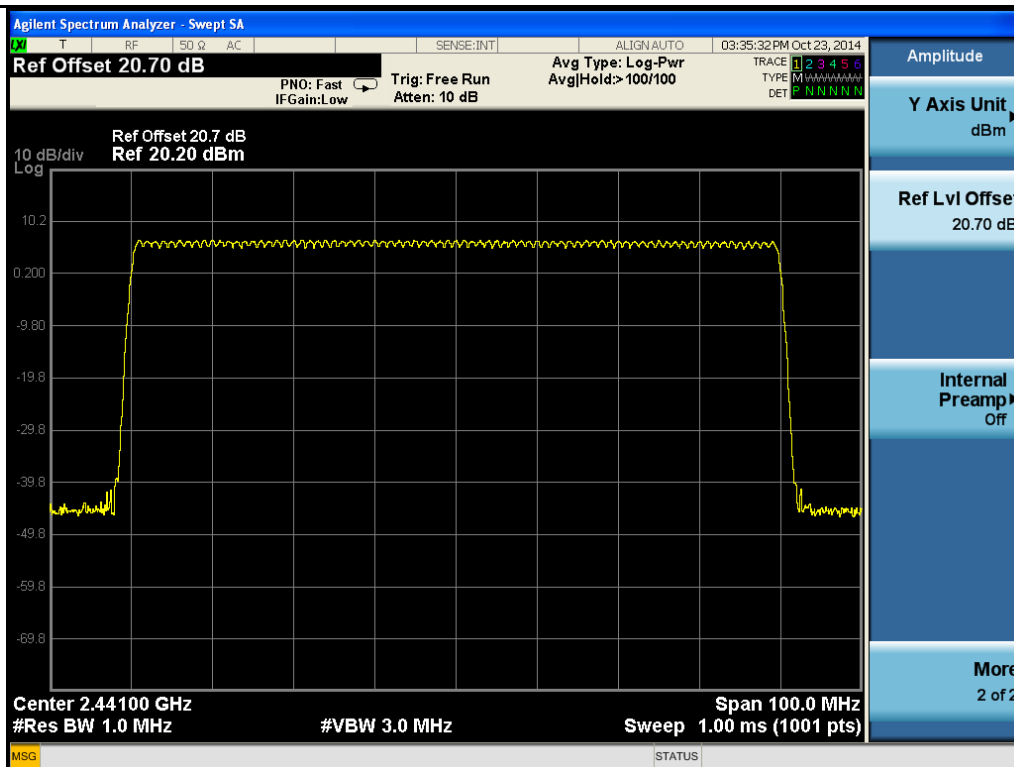
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Channel Number	Limit	Pass/Fail
79	15	Pass



BDR – 79 Channels



EDR – 79 Channels

10.5 Time of Occupancy (Bluetooth BDR/EDR)

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS-210 (A2.6)	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.	☒
Test Setup		
Procedure	1. EUT was set for low, mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	10/23/2014	Environmental condition Temperature 24oC Relative Humidity 47% Atmospheric Pressure 1019mbar
Remark	$\text{Dwell time (sec)} = \text{Pulse Time (ms)} \times (1600 \div 6 \div 79) \times 31.6 \text{ sec}$	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes (See below) ☐ N/A

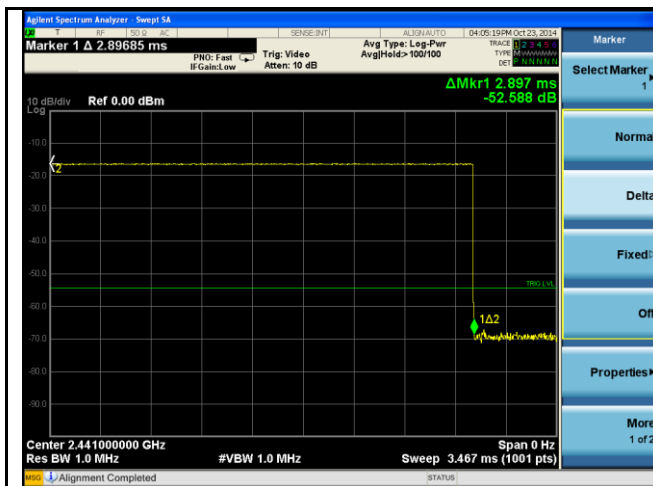
Test Plot ☒ Yes (See below) ☐ N/A

Bluetooth Basic Rate Test Mode (1Mbps)

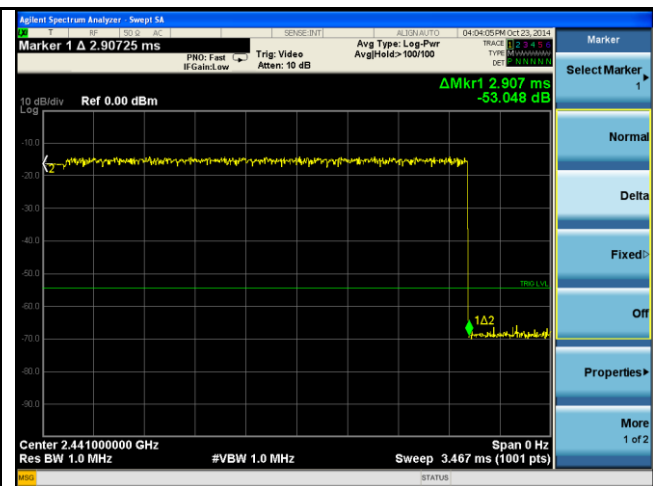
Channel	Channel Frequency (MHz)	On Time (mSec)	Dwell Time (Sec)	Limit (Sec)
Mid	2441	2.897	0.308	0.4

Bluetooth EDR Test Mode (3Mbps)

Channel	Channel Frequency (MHz)	On Time (mSec)	Dwell Time (Sec)	Limit (Sec)
Mid	2441	2.907	0.310	0.4



BDR Middle Channel (On-Time)



EDR Middle Channel (On-Time)

10.6 Peak Output Power (Bluetooth BDR/EDR)

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	☒
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & < 50 channels: ≤ 0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤ 1 Watt	☐
Test Setup			
Test Procedure	<u>Measurement using a Power Meter (PM)</u> Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required. - Connect EUT's RF output power to power meter - Set EUT to be continuous transmission mode - Measurement the average output power using power meter and record the result - Repeat above steps for different test channel and other modulation type.		
Test Date	10/23/2014	Environmental condition	Temperature 23°C Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Output Power measurement result (Bluetooth)

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	Bluetooth BDR	2402	Low	2.3	30	Pass
Output power	Bluetooth BDR	2441	Mid	2.4	30	Pass
Output power	Bluetooth BDR	2480	High	2.2	30	Pass
Output power	Bluetooth EDR	2402	Low	2.4	30	Pass
Output power	Bluetooth EDR	2441	Mid	2.6	30	Pass
Output power	Bluetooth EDR	2480	High	2.4	30	Pass

10.7 Band Edge (Bluetooth BDR/EDR)

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	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 <u>Band Edge measurement procedure</u> 1. Set the EUT to maximum power setting and enable the EUT transmit continuously. 2. Band edge emissions must be at least 30 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	10/17/2014	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	-		
Result	☒ Pass ☐ Fail		

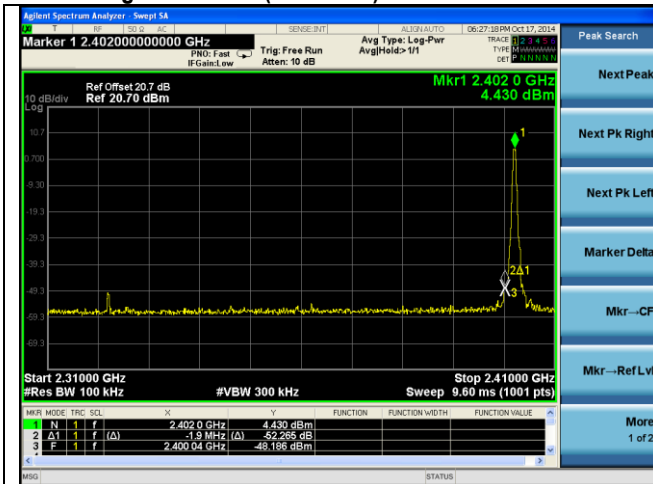
Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
Band Edge	100KHz	≥3 x RBW	135 MHz / 55 MHz	Peak	Auto	Peak MAX	-

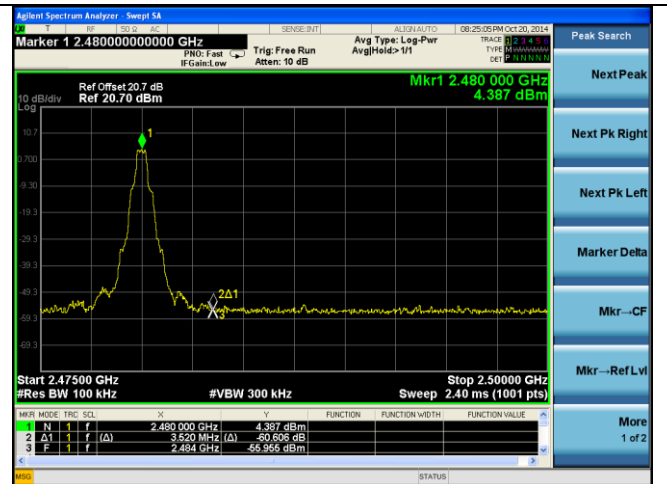
Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

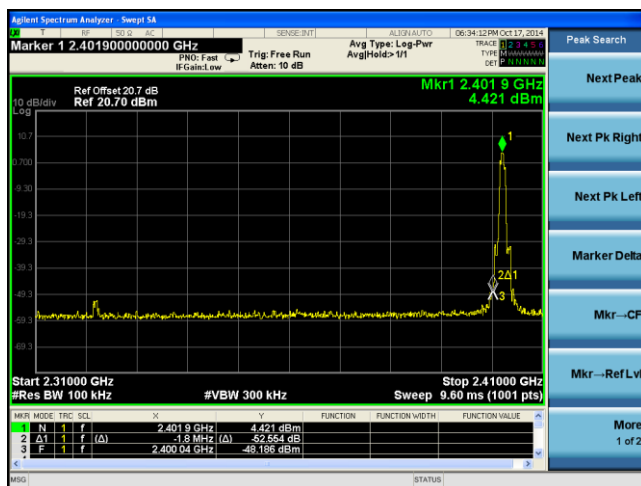
Band Edge Test Plots (Bluetooth)



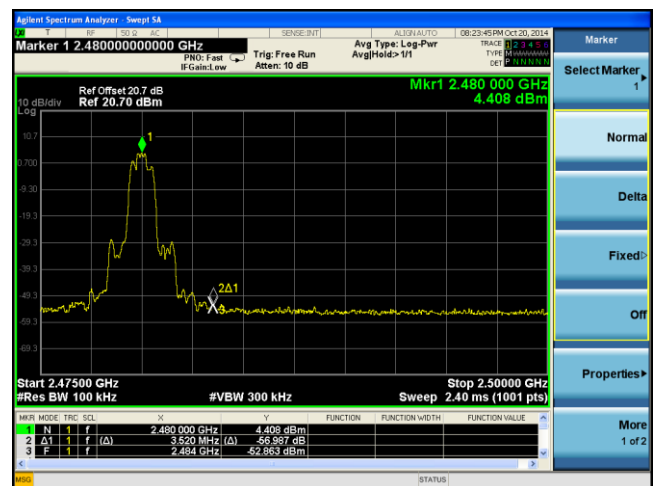
Band Edge-BDR Low



Band Edge-BDR High



Band Edge-EDR Low



Band Edge-EDR High

10.8 99% Occupied Bandwidth (BT-BDR/EDR)

Requirement(s):

Spec	Requirement	Applicable
RSS Gen 4.6.1	The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual. The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth	☒
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	10/20/2014	Environmental condition Temperature 23oC Relative Humidity 47% Atmospheric Pressure 1019mbar
Remark	-	
Result	☒ Pass ☐ Fail	

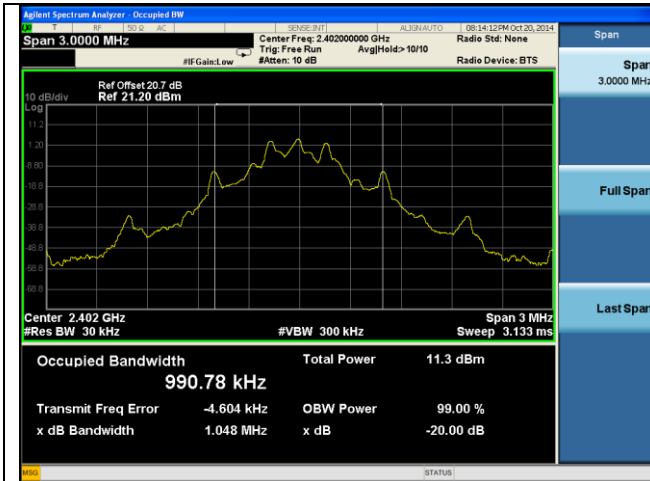
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

99%dB Bandwidth measurement result for BT (BDR/EDR)

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
99% BW	BT-BDR	2402	Low	990.78	N/A	N/A
99% BW	BT-BDR	2441	Mid	992.06	N/A	N/A
99% BW	BT-BDR	2480	High	990.58	N/A	N/A
99% BW	BT_EDR	2402	Low	1.127	N/A	N/A
99% BW	BT_EDR	2441	Mid	1.127	N/A	N/A
99% BW	BT_EDR	2480	High	992.06	N/A	N/A

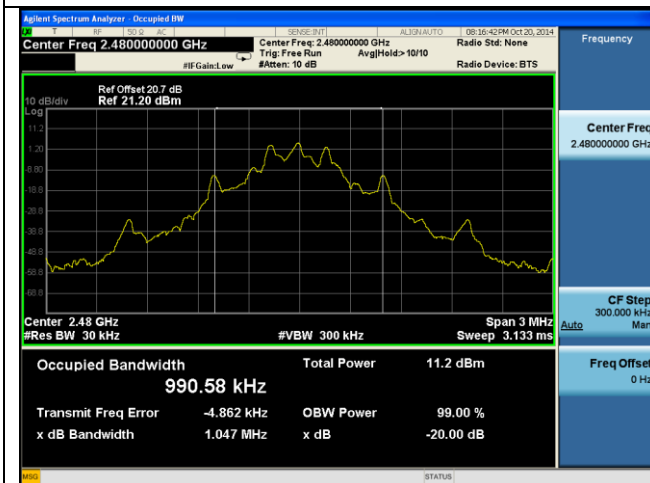
99dB Bandwidth Test Plot (BT)



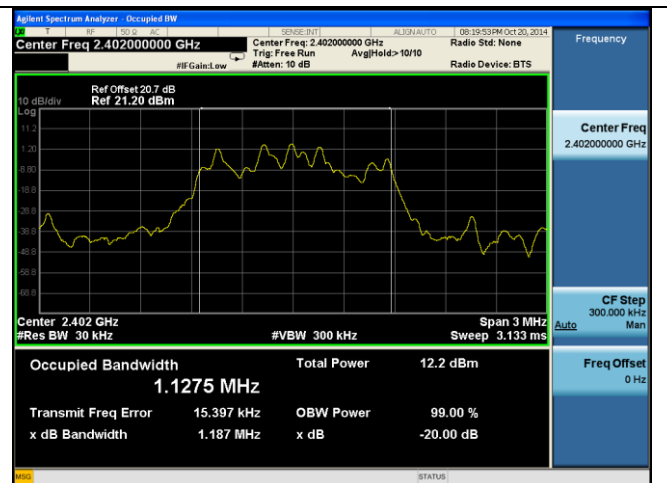
99% BW –Bluetooth BDR 2402MHz



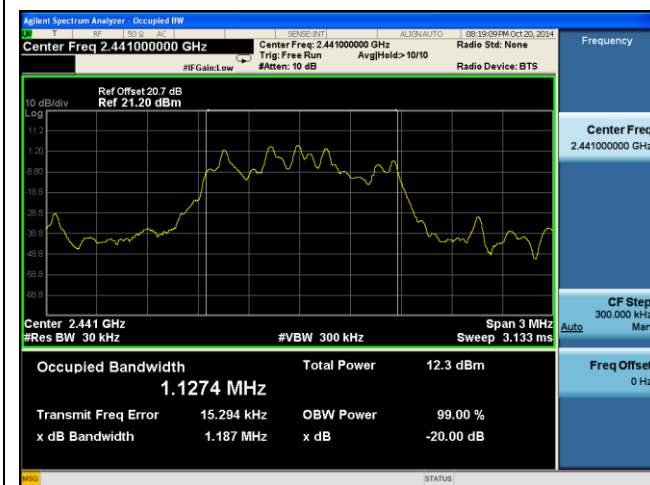
99% BW –Bluetooth BDR 2441MHz



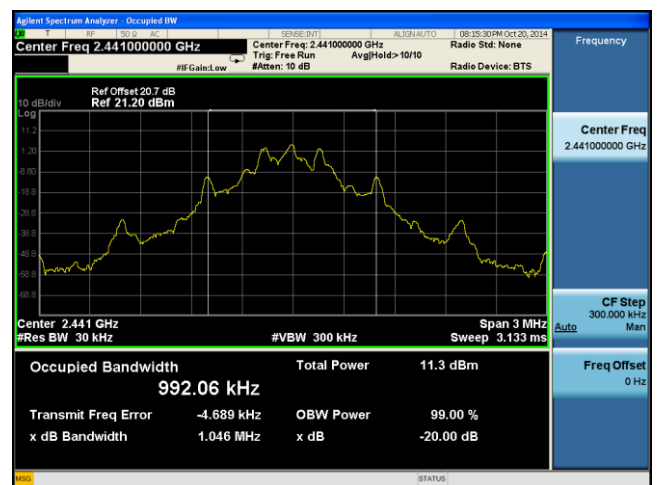
99% BW –Bluetooth BDR 2480MHz



99% BW –Bluetooth EDR 2402MHz



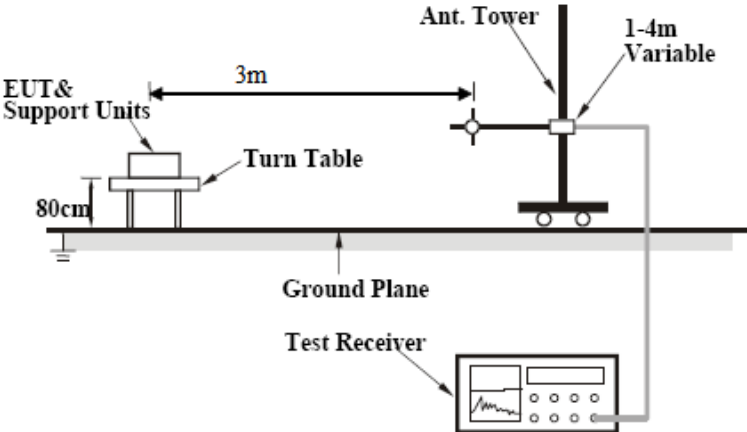
99% BW –Bluetooth EDR 2441MHz



99% BW –Bluetooth EDR 2480MHz

10.9 Transmitter Radiated Spurious Emissions Below 1GHz

Requirement(s):

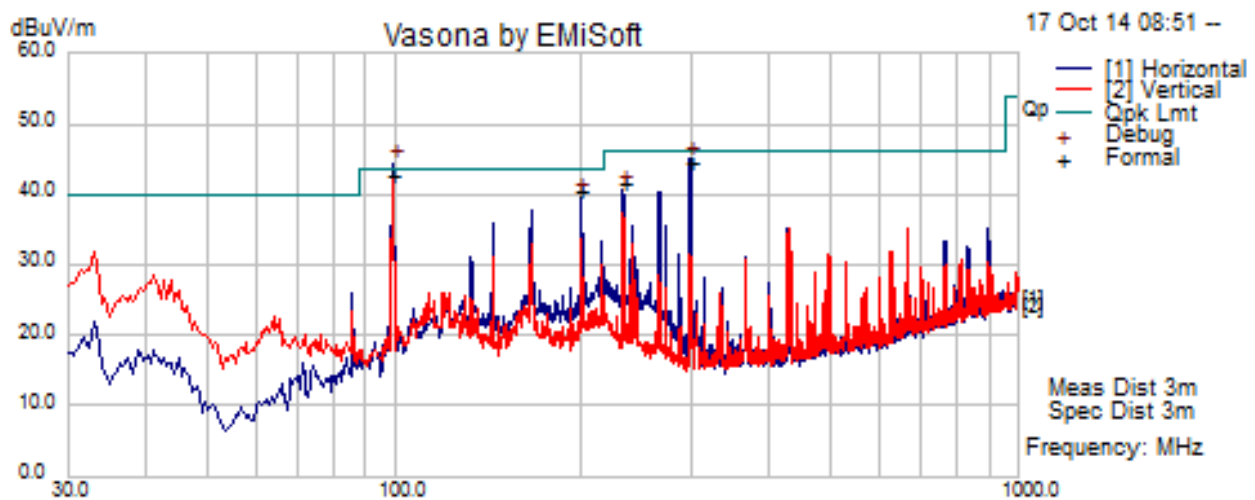
Spec	Item	Requirement	Applicable							
47CFR§15.247(d), RSS210(A8.5)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges	☒							
		<table><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></table>		Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960
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	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.									
Result	☒ Pass ☐ Fail									

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Radiated Emission Test Results (Below 1GHz)

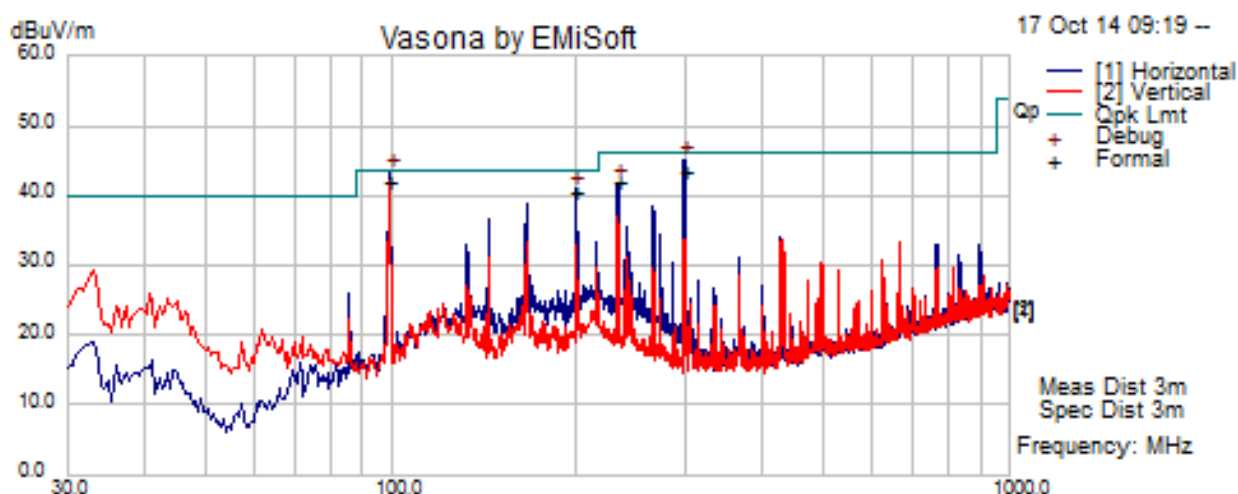
Test specification:	Radiated Spurious Emissions (30MHz – 1000MHz)			
Environmental Conditions:	Temp(°C):	20	Result:	☒ Pass ☐ Fail
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	17-Oct-14			
Remarks:	Bluetooth BDR – 2480MHz			



Quasi Max Measurement

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
99.67	70.51	1.83	-29.80	42.54	Quasi Max	H	195.00	203.00	43.50	-0.96	Pass
298.45	67.58	2.99	-26.20	44.37	Quasi Max	H	114.00	341.00	46.00	-1.63	Pass
199.02	64.97	2.50	-27.04	40.42	Quasi Max	H	152.00	356.00	43.50	-3.08	Pass
232.61	67.05	2.69	-28.37	41.37	Quasi Max	H	144.00	357.00	46.00	-4.63	Pass

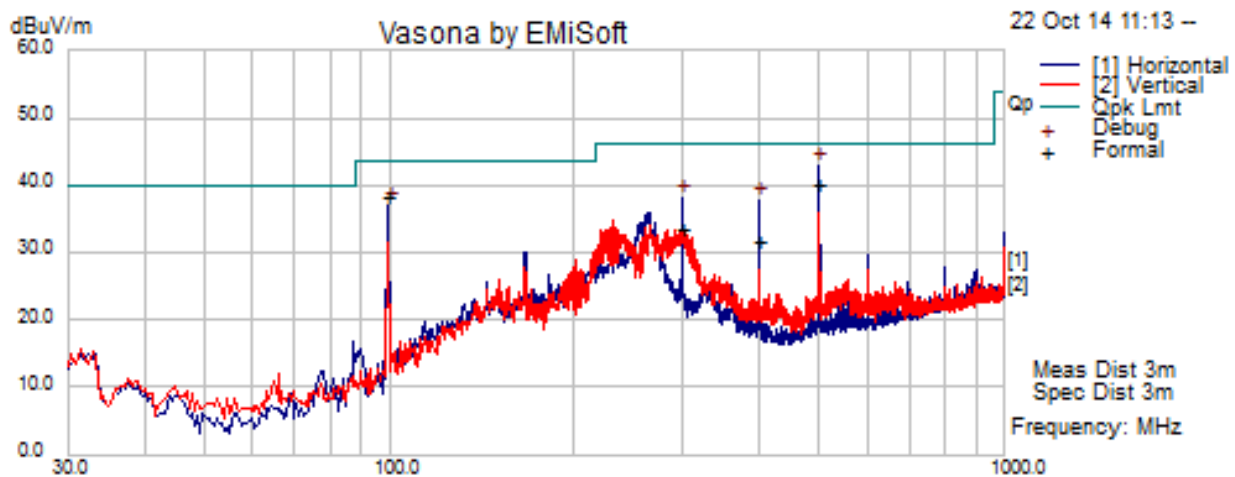
Test specification:	Radiated Spurious Emissions (30MHz – 1000MHz)			
Environmental Conditions:	Temp(°C):	20	Result:	☒ Pass ☐ Fail
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	17-Oct-14			
Remarks:	Bluetooth EDR – 2480MHz			



Quasi Max Measurement

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
99.76	69.95	1.83	-29.77	42.01	Quasi Max	H	315.00	220.00	43.50	-1.49	Pass
298.88	66.61	3.00	-26.19	43.41	Quasi Max	H	101.00	347.00	46.00	-2.59	Pass
199.01	65.17	2.50	-27.04	40.62	Quasi Max	H	135.00	23.00	43.50	-2.88	Pass
233.18	67.45	2.69	-28.34	41.80	Quasi Max	H	130.00	7.00	46.00	-4.20	Pass

Test specification:	Radiated Spurious Emissions (30MHz – 1000MHz)			
Environmental Conditions:	Temp(°C):	20	Result:	☒ Pass ☐ Fail
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	22-Oct-14			
Remarks:	Bluetooth BDR (2480MHz) and WLAN 802.11g (2462MHz) transmitting simultaneously			



Quasi Max Measurement

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
99.59	66.20	1.82	-29.82	38.20	Quasi Max	H	324.00	207.00	43.50	-5.30	Pass
298.77	56.74	2.99	-26.20	33.54	Quasi Max	H	111.00	348.00	46.00	-12.46	Pass
499.64	57.83	4.16	-21.89	40.10	Quasi Max	H	209.00	54.00	46.00	-5.90	Pass
399.76	52.45	3.33	-24.08	31.70	Quasi Max	H	108.00	219.00	46.00	-14.30	Pass

10.10 Transmitter Radiated Spurious Emissions Above 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS210(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	- The EUT was switched on and allowed to warm up to its normal operating condition. - 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: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
Radiated Spurious Emission	1MHz	3MHz	1GHz - 25 GHz	Peak	Auto	Max hold	PK Measurement
Radiated Spurious Emission	1MHz	10Hz	1GHz - 25 GHz	Peak	Auto	Max hold	Ave Measurement

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Transmitter Radiated Emission Test Results (Above 1GHz)

Test specification:	Radiated Spurious Emissions (above 1GHz)			
Environmental Conditions:	Temp(°C):	20	Result:	☒ Pass ☐ Fail
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	120VA, 60Hz			
Tested by:	Teody Manansala			
Test Date:	10/20/2014			
Remarks:	Bluetooth BDR/EDR			

Bluetooth BDR – 2402MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17855.48	39.98	6.60	13.98	60.56	Peak Max	V	143.00	239.00	74.00	-13.44	Pass
11638.17	42.08	5.17	6.03	53.27	Peak Max	V	173.00	273.00	74.00	-20.73	Pass
1007.90	47.23	1.75	-7.17	41.81	Peak Max	V	181.00	148.00	74.00	-32.19	Pass
17855.48	26.71	6.60	13.98	47.29	Average Max	V	143.00	239.00	54.00	-6.71	Pass
11638.17	28.36	5.17	6.03	39.56	Average Max	V	173.00	273.00	54.00	-14.44	Pass
1007.90	34.48	1.75	-7.17	29.05	Average Max	V	181.00	148.00	54.00	-24.95	Pass

Restricted Band Bluetooth BDR – 2402MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
2390	41.75	2.69	-3.54	40.91	Peak Max	V	322.00	235.00	74.00	-33.09	Pass
2390	41.48	2.69	-3.53	40.64	Peak Max	H	201.00	294.00	74.00	-33.36	Pass
2390	28.82	2.69	-3.54	27.98	Average Max	V	322.00	235.00	54.00	-26.02	Pass
2390	28.83	2.69	-3.53	27.98	Average Max	H	201.00	294.00	54.00	-26.02	Pass

Bluetooth BDR – 2441MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17999.97	39.83	6.61	14.46	60.91	Peak Max	H	219.00	227.00	74.00	-13.09	Pass
4122.00	41.96	3.35	-0.21	45.10	Peak Max	V	272.00	34.00	74.00	-28.90	Pass
1010.36	47.22	1.75	-7.17	41.81	Peak Max	V	307.00	139.00	74.00	-32.19	Pass
17999.97	26.73	6.61	14.46	47.80	Average Max	H	219.00	227.00	54.00	-6.20	Pass
4122.00	29.14	3.35	-0.21	32.28	Average Max	V	272.00	34.00	54.00	-21.72	Pass
1010.36	34.36	1.75	-7.17	28.94	Average Max	V	307.00	139.00	54.00	-25.06	Pass

Bluetooth BDR – 2480MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17889.92	39.36	6.6	14.1	60.06	Peak Max	H	156	260	74	-13.94	Pass
5084.215	43.18	3.62	0.45	47.25	Peak Max	V	318	158	74	-26.75	Pass
1008.713	47.75	1.75	-7.17	42.33	Peak Max	H	341	30	74	-31.67	Pass
17889.92	26.79	6.6	14.1	47.49	Average Max	H	156	260	54	-6.51	Pass
5084.215	29.93	3.62	0.45	34	Average Max	V	318	158	54	-20	Pass
1008.713	34.38	1.75	-7.17	28.96	Average Max	H	341	30	54	-25.04	Pass

Restricted Band Bluetooth BDR – 2480MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
2483.5	40.54	2.72	-3.32	39.95	Peak Max	V	148.00	183.00	74.00	-34.05	Pass
2483.5	40.27	2.72	-3.32	39.67	Peak Max	H	124.00	305.00	74.00	-34.33	Pass
2483.5	27.71	2.72	-3.32	27.12	Average Max	V	148.00	183.00	54.00	-26.88	Pass
2483.5	27.69	2.72	-3.32	27.09	Average Max	H	124.00	305.00	54.00	-26.91	Pass

Bluetooth EDR – 2402MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17947.08	39.84	6.61	14.29	60.74	Peak Max	H	128.00	227.00	74.00	-13.26	Pass
4152.61	41.83	3.36	-0.21	44.97	Peak Max	V	274.00	303.00	74.00	-29.03	Pass
1026.99	46.34	1.77	-7.13	40.98	Peak Max	V	224.00	281.00	74.00	-33.02	Pass
17947.08	26.79	6.61	14.29	47.69	Average Max	H	128.00	227.00	54.00	-6.31	Pass
4152.61	29.04	3.36	-0.21	32.18	Average Max	V	274.00	303.00	54.00	-21.82	Pass
1026.99	33.80	1.77	-7.13	28.43	Average Max	V	224.00	281.00	54.00	-25.57	Pass

Restricted Band Bluetooth EDR – 2402MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
2390	41.62	2.69	-3.53	40.77	Peak Max	V	189.00	254.00	74.00	-33.23	Pass
2390	41.88	2.69	-3.54	41.04	Peak Max	H	173.00	165.00	74.00	-32.96	Pass
2390	28.86	2.69	-3.53	28.01	Average Max	V	189.00	254.00	54.00	-25.99	Pass
2390	28.86	2.69	-3.54	28.02	Average Max	H	173.00	165.00	54.00	-25.98	Pass

Bluetooth EDR – 2441MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17890.79	39.85	6.60	14.10	60.55	Peak Max	V	204.00	272.00	74.00	-13.45	Pass
8332.57	41.38	4.22	5.09	50.70	Peak Max	V	174.00	227.00	74.00	-23.30	Pass
1015.41	47.07	1.76	-7.16	41.67	Peak Max	V	182.00	57.00	74.00	-32.33	Pass
17890.79	26.80	6.60	14.10	47.50	Average Max	V	204.00	272.00	54.00	-6.50	Pass
8332.57	28.64	4.22	5.09	37.96	Average Max	V	174.00	227.00	54.00	-16.04	Pass
1015.41	33.95	1.76	-7.16	28.55	Average Max	V	182.00	57.00	54.00	-25.45	Pass

Bluetooth EDR – 2480MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17907.30	40.10	6.60	14.15	60.86	Peak Max	H	210.00	224.00	74.00	-13.14	Pass
5148.70	43.47	3.64	0.53	47.63	Peak Max	V	229.00	332.00	74.00	-26.37	Pass
1009.92	48.00	1.75	-7.17	42.58	Peak Max	V	152.00	214.00	74.00	-31.42	Pass
17907.30	26.77	6.60	14.15	47.53	Average Max	H	210.00	224.00	54.00	-6.47	Pass
5148.70	30.04	3.64	0.53	34.20	Average Max	V	229.00	332.00	54.00	-19.80	Pass
1009.92	34.15	1.75	-7.17	28.73	Average Max	V	152.00	214.00	54.00	-25.27	Pass

Restricted Band Bluetooth EDR – 2480MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
2483.5	51.52	2.72	-3.32	50.92	Peak Max	V	101.00	165.00	74.00	-23.08	Pass
2483.5	40.27	2.72	-3.32	39.68	Peak Max	H	230.00	313.00	74.00	-34.32	Pass
2483.5	42.76	2.72	-3.32	42.17	Average Max	V	101.00	165.00	54.00	-11.83	Pass
2483.5	27.61	2.72	-3.32	27.01	Average Max	H	230.00	313.00	54.00	-26.99	Pass

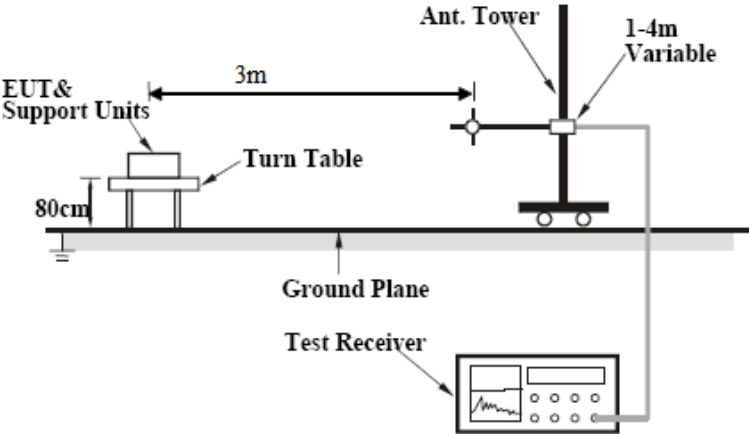
Test specification:	Radiated Spurious Emissions (above 1GHz)			
Environmental Conditions:	Temp(°C):	20	Result:	☒ Pass ☐ Fail
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	120VA, 60Hz			
Tested by:	Teody Manansala			
Test Date:	16-Oct-14			
Remarks:	Bluetooth and WLAN transmitting simultaneously			

WLAN 802.11n20 - 2437MHz and Bluetooth BDR – 2441MHz transmitting simultaneously

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17881.05	39.73	6.60	14.07	60.40	Peak Max	H	234.00	350.00	74.00	-13.60	Pass
5113.47	42.93	3.63	0.48	47.04	Peak Max	V	197.00	305.00	74.00	-26.96	Pass
1015.98	47.58	1.76	-7.15	42.18	Peak Max	V	112.00	229.00	74.00	-31.82	Pass
17881.05	26.90	6.60	14.07	47.56	Average Max	H	234.00	350.00	54.00	-6.44	Pass
5113.47	30.13	3.63	0.48	34.24	Average Max	V	197.00	305.00	54.00	-19.76	Pass
1015.98	34.75	1.76	-7.15	29.35	Average Max	V	112.00	229.00	54.00	-24.65	Pass

10.11 Receiver Radiated Spurious Emissions Below 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable							
47CFR§15.247(d), RSS210(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	☒							
		<table><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></table>		Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960
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	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. No outstanding emission except the noise floor was found.									
Result	☒ Pass ☐ Fail									

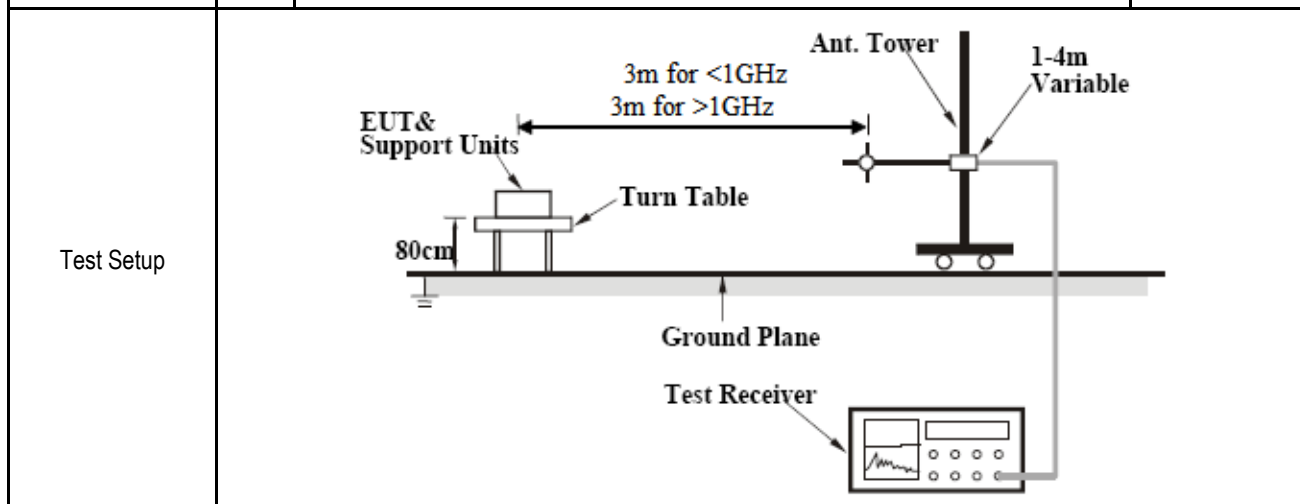
Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10.12 Receiver Spurious Emissions Above 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(d), RSS210(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(a)	☐



Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - 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: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - A Quasi-peak measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Test Date	10/21/2014	Environmental condition	Temperature 20 Relative Humidity 36 Atmospheric Pressure 1020
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test specification:	Receiver Radiated Spurious Emissions (Above 1GHz)			
Environmental Conditions:	Temp(°C):	20	Result:	☒ Pass ☐ Fail
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	120VA, 60Hz			
Tested by:	Teody Manansala			
Test Date:	21-Oct-14			
Remarks:	Bluetooth Receiver Mode			

Bluetooth BDR – 2480MHz Receiver Mode

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17974.59	39.96	7.01	14.38	61.35	Peak Max	V	100.00	232.00	74.00	-12.65	Pass
14591.60	42.64	6.66	10.57	59.87	Peak Max	V	198.00	352.00	74.00	-14.13	Pass
1016.17	47.57	0.94	-7.15	41.36	Peak Max	H	333.00	127.00	74.00	-32.64	Pass
17974.59	26.70	7.01	14.38	48.10	Average Max	V	100.00	232.00	54.00	-5.90	Pass
14591.60	29.56	6.66	10.57	46.79	Average Max	V	198.00	352.00	54.00	-7.21	Pass
1016.17	33.64	0.94	-7.15	27.43	Average Max	H	333.00	127.00	54.00	-26.57	Pass

Bluetooth EDR – 2480MHz Receiver Mode

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
17982.14	39.95	7.01	14.40	61.37	Peak Max	V	201.00	200.00	74.00	-12.63	Pass
14543.32	42.46	6.63	10.78	59.88	Peak Max	V	174.00	127.00	74.00	-14.12	Pass
1000.00	46.79	0.93	-7.19	40.52	Peak Max	V	296.00	322.00	74.00	-33.48	Pass
17982.14	26.72	7.01	14.40	48.13	Average Max	V	201.00	200.00	54.00	-5.87	Pass
14543.32	29.39	6.63	10.78	46.81	Average Max	V	174.00	127.00	54.00	-7.19	Pass
1000.00	33.47	0.93	-7.19	27.21	Average Max	V	296.00	322.00	54.00	-26.79	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
R&S LISN	ESH2-Z5	861741/013	05/18/2014	1 Year	05/18/2015	☒
CHASE LISN	MN2050B	1018	07/24/2014	1 Year	07/24/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
Radiated Emissions						
R & S Receiver	ESL6	100178	03/01/2014	1 Year	03/01/2015	☒
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
ETS-Lingren Loop Antenna	6512	00049120	05/13/2014	1 Year	05/13/2015	☐
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	07/03/2014	1 Year	07/03/2015	☒
Horn Antenna (1-26.5GHz)	3115	10SL0059	04/26/2014	1 Year	04/26/2015	☒
Horn Antenna (18-40 GHz)	AH-840	101013	04/23/2014	1 Year	04/23/2015	☐
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/30/2014	1 Year	05/30/2015	☒
Microwave Preamplifier (18-40 GHz)	PA-840	181251	05/30/2014	1 Year	05/30/2015	☐
3 Meters SAC	3M	N/A	10/13/2014	1 Year	10/13/2015	☒
10 Meters SAC	10M	N/A	06/05/2014	1 Year	06/05/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY50210206	05/30/2014	1 Year	05/30/2015	☒
Spectrum Analyzer	E4407B	US88441016	05/31/2014	1 Year	05/31/2015	☐
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒

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
Hong Kong 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 NCC 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 Measurement
Australia CAB Recognition		EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4 Radio communications: 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