RF TEST REPORT

SIEMIC
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Report No.: FCC_IC RF_SL15101901-SLX-027_DSS Rev 1.0
Supersede Report No.: FCC_IC RF_SL15101901-SLX-027_DSS

Applicant	:	Silex Technology, Inc.
Product Name	:	802.11a/b/g/n/ac + BT4.1 module
Model No.	:	SX-SDPAC
Test Standard	:	47 CFR 15.247 RSS-247 Issue 1.0, May 2015
Test Method	:	ANSI C63.10: 2013 RSS-Gen Issue 4, Nov 2014 FCC Public Notice DA 00-705
FCC ID	:	N6C-SDPAC
IC ID	:	4908A-SDPAC
Dates of test	:	06/01/2016 to 06/30/2016
Issue Date	:	08/09/2016
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:	
Gary Chou	Chen Ge
Gary Chou	**Chen Ge**
Test Engineer	Engineer Reviewer

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

ilac-MRA
A2LA 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	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_IC RF_SL15101901-SLX-027_DSS	None	Original	07/05/2016
FCC_IC RF_SL15101901-SLX-027_DSS Rev 1.0	1.0	Original	08/09/2016

2 Executive Summary

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

Company: Silex Technology, Inc.
Product: 802.11a/b/g/n/ac + BT 4.1 module
Model: SX-SDPAC

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	Silex Technology, Inc
Applicant Address	2-3-1 Hikaridai, Seika-cho, Kyoto, 619-0237 Japan
Manufacturer Name	Silex Technology, Inc
Manufacturer Address	2-3-1 Hikaridai, Seika-cho, Kyoto, 619-0237 Japan

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	802.11a/b/g/n/ac + BT 4.1 module
Model No.	SX-SDPAC
Trade Name	Silex
Serial No.	N/A
Host Model No.	N/A
Input Power	5VDC
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	05/26/2016
Equipment Class/ Category	DTS, UNII
Clock Frequencies	N/A
Port/Connectors	PoE, Ethernet

6.2 Spec for BT Radio

Radio Type	Bluetooth (Ver4.0+EDR)
Operating Frequency	2402MHz-2480MHz
Modulation	FHSS (BDR, EDR)
Channel Spacing	1MHz (BDR, EDR)
Antenna Type	PCB Antenna
Antenna Gain	2.4GHz: 3.25 dBi
Antenna Connector Type	U.FL connector

Channel List

Type	Channel No.	Frequency (MHz)	Power Setting
Bluetooth(BRD) 2402-2480MHz	0	2402	12
	39	2441	12
	78	2480	12
Bluetooth(EDR) 2402-2480MHz	0	2402	12
	39	2441	12
	78	2480	12

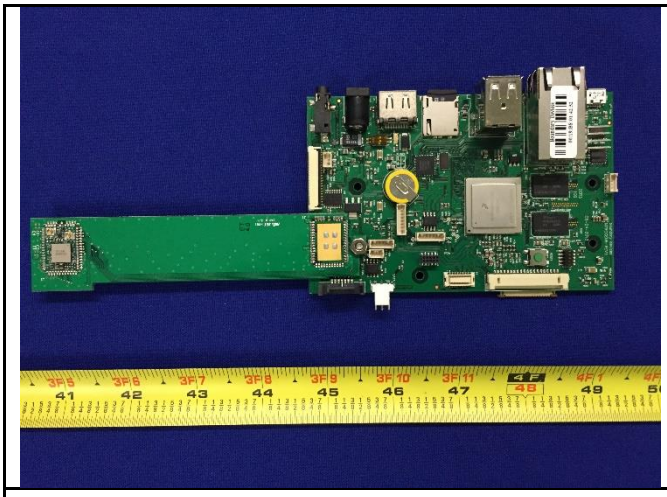
6.3 EUT test modes/configuration Description

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

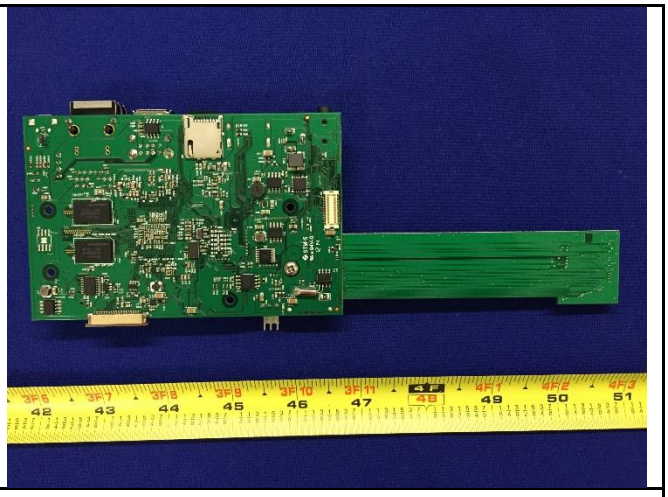
6.4 Antenna Description

Vendor	Part Number	Antenna type	W24	W52	W53	W56
Molex	146153	PCB type di-pole antenna	3.2	4.75	4.75	4.75
Unictron	H2B1PC1A1C (AA258)	PCB type di-pole antenna	2.67	3.35	3.35	3.35
Unictron	H2B1PD1A1C (AA222)	PCB type di-pole antenna	2.57	3.15	3.15	3.15

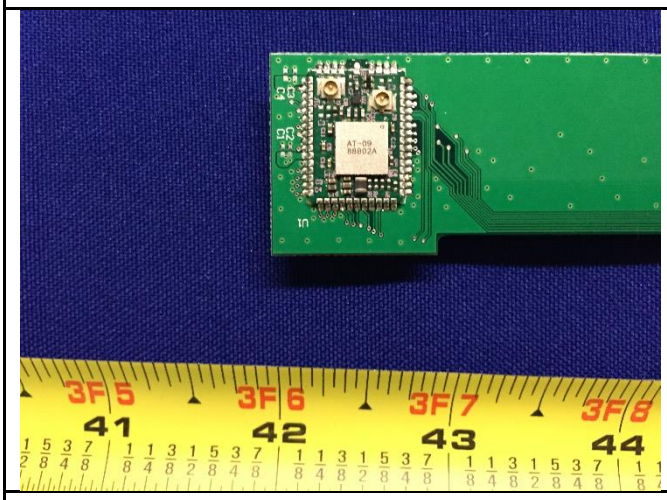
6.5 EUT Photos



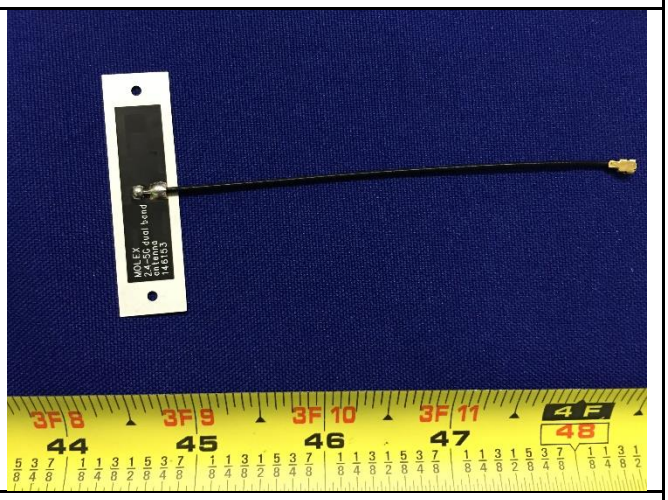
Top View



Bottom View

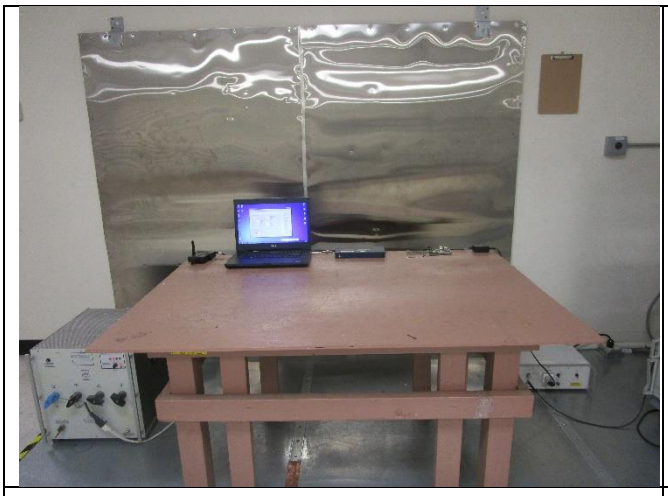


Radio Module View

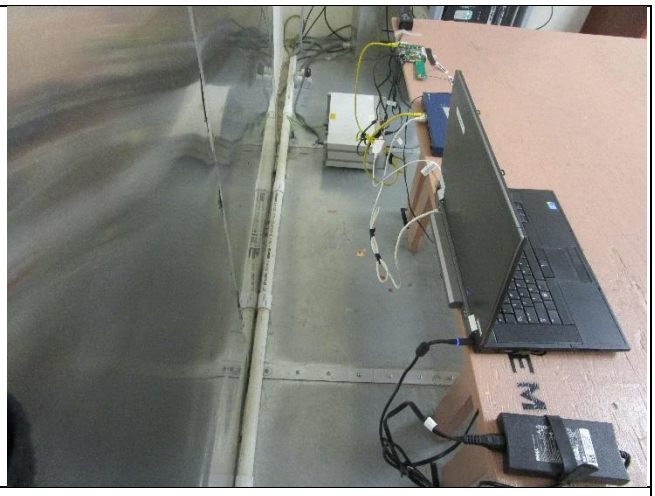


Antenna View

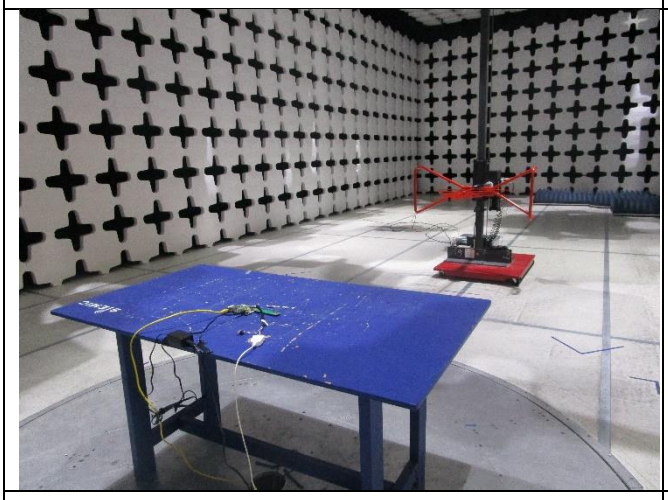
6.6 EUT Test Setup Photos



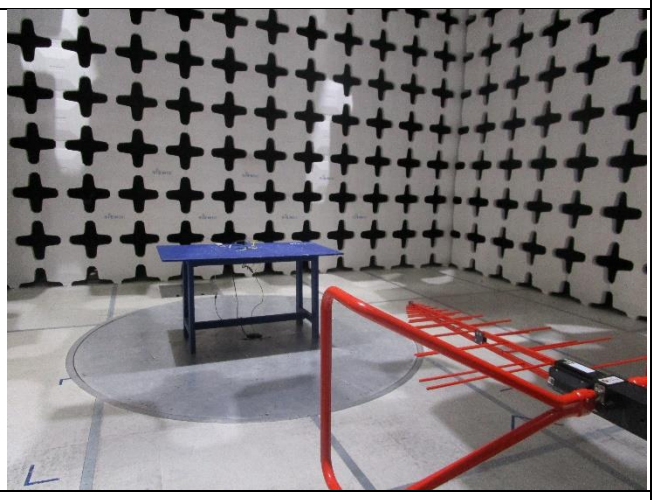
AC Line Conducted Emissions – Front View



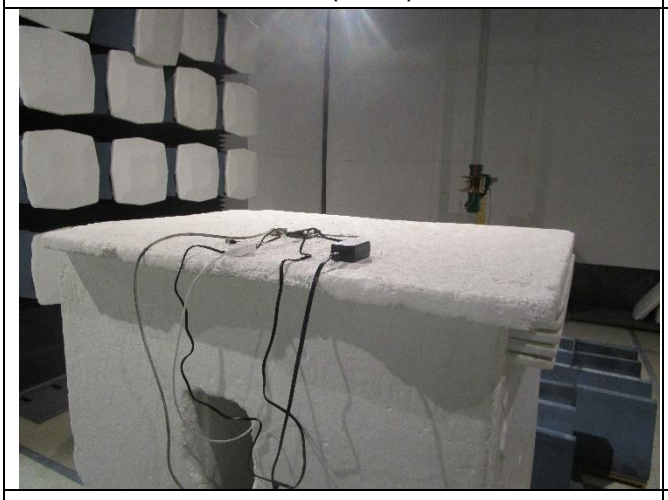
AC Line Conducted Emissions – Rear View



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	Latitude E6510	N/A	Dell	-
2	Hub	DS108	N/A	NetGear	-

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	Laptop	EUT	Laptop	1	Unshielded	-
RJ45	EUT	Hub	Laptop	Hub	1	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	QRCT	Set the EUT to transmit continuously in diferent test mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC	15.205	FCC	ANSI C63.10: 2013 Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS Gen 8.10		RSS Gen Issue 4: 2014	
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.10: 2013	☒ Pass ☐ N/A
	IC	RSS Gen 8.8		RSS Gen Issue 4: 2014	

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	RSS247 (5.1.5)	IC	-	
20dB Occupied Bandwidth	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS247 (5.1.2)	IC	-	
99% Occupied Bandwidth	FCC	15.247(a)(2)	FCC		☒ Pass ☐ N/A
	IC	RSS Gen 6.6	IC	RSS Gen Issue 4: 2014 -	
Number of Hopping Channels	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS247 (5.1.5)	IC	-	
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS247(5.5)	IC	-	
Time of Occupancy	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS247 (5.1.5)	IC	-	
Output Power	FCC	15.247(b)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS247 (5.4.2)	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	RSS247 (5.4.6)	IC	-	
Power Spectral Density	FCC	15.247(e)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS247 (5.2.2)	IC	-	
Hybrid System Requirement	FCC	15.247(f)	FCC	Public Notice DA 00-705	☐ Pass ☒ N/A
	IC	RSS247 (5.3)	IC	-	
Hopping Capability	FCC	15.247(g)	FCC	Public Notice DA 00-705	☒ Pass ☐ N/A
	IC	RSS247 (5.1.5)	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

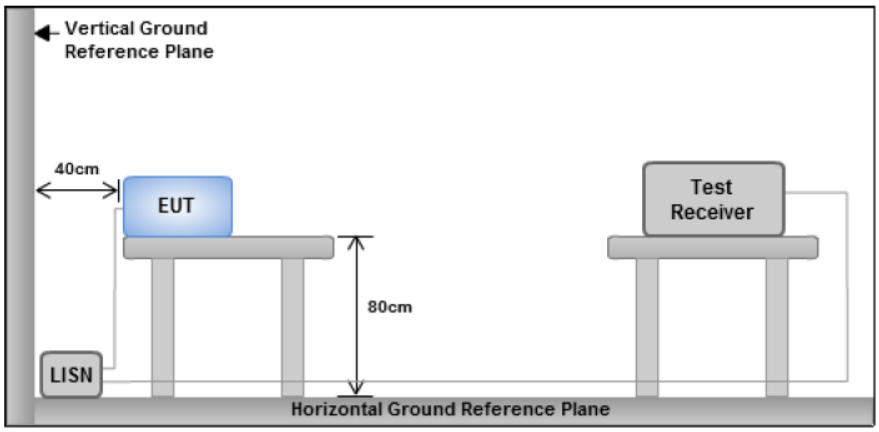
Emissions			
Test Item	**Frequency Range**	**Description**	**Uncertainty**
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and 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 μH/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 80 cm from EUT and at least 80 cm from other units and other metal planes		
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		

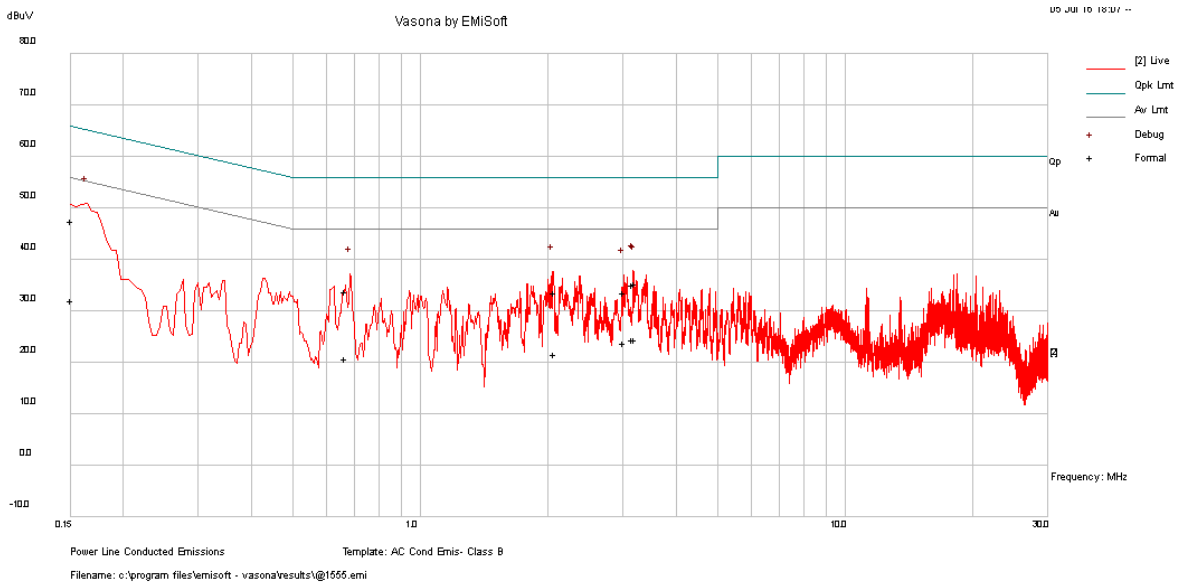
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at Conducted Emission test site.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Chen Ge			
Test Date:	07/05/2016			
Remarks	AC Line @ Line			



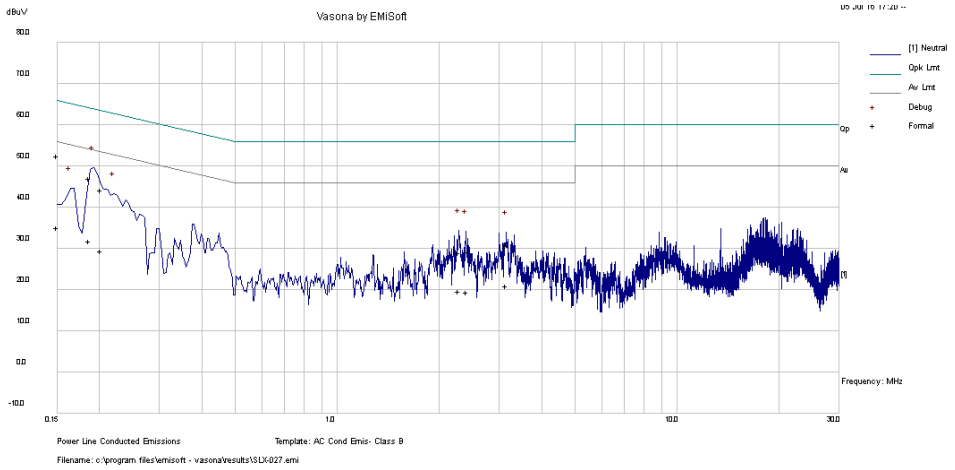
Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.15	35.87	10	1.78	47.65	Quasi Peak	Live	65.93	-18.27	Pass
3.16	24.6	10.03	0.55	35.18	Quasi Peak	Live	56	-20.82	Pass
2.07	23.11	10.02	0.55	33.69	Quasi Peak	Live	56	-22.31	Pass
3.20	24.82	10.03	0.55	35.4	Quasi Peak	Live	56	-20.6	Pass
0.67	23.32	10.01	0.62	33.95	Quasi Peak	Live	56	-22.05	Pass
3.01	23.11	10.03	0.55	33.69	Quasi Peak	Live	56	-22.31	Pass
0.15	20.43	10	1.78	32.22	Average	Live	55.93	-23.71	Pass
3.16	13.88	10.03	0.55	24.46	Average	Live	46	-21.54	Pass
2.07	11.19	10.02	0.55	21.76	Average	Live	46	-24.24	Pass
3.20	13.85	10.03	0.55	24.43	Average	Live	46	-21.57	Pass
0.67	10.1	10.01	0.62	20.73	Average	Live	46	-25.27	Pass
3.01	13.34	10.03	0.55	23.92	Average	Live	46	-22.08	Pass

Note: The results above show only the worst case.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Chen Ge			
Test Date:	07/05/2016			
Remarks	AC Line @ Neutral			



Neutral Plot at 120Vac, 60Hz

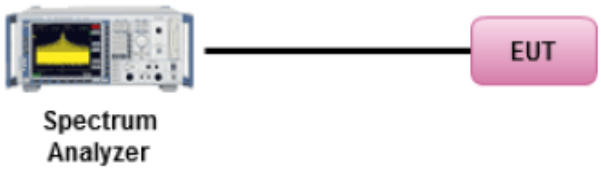
Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.19	35.67	10	1.41	47.09	Quasi Peak	Neutral	64.17	-17.09	Pass
0.20	33.08	10	1.3	44.39	Quasi Peak	Neutral	63.53	-19.14	Pass
0.15	40.7	10	1.8	52.5	Quasi Peak	Neutral	66	-13.5	Pass
2.29	18.5	10.02	0.55	29.08	Quasi Peak	Neutral	56	-26.92	Pass
2.41	18.74	10.03	0.55	29.32	Quasi Peak	Neutral	56	-26.68	Pass
3.15	20.21	10.03	0.55	30.79	Quasi Peak	Neutral	56	-25.21	Pass
0.19	20.57	10	1.41	31.99	Average	Neutral	54.17	-22.19	Pass
0.20	18.21	10	1.3	29.51	Average	Neutral	53.53	-24.02	Pass
0.15	23.43	10	1.8	35.24	Average	Neutral	56	-20.76	Pass
2.29	9.26	10.02	0.55	19.84	Average	Neutral	46	-26.16	Pass
2.41	8.91	10.03	0.55	19.49	Average	Neutral	46	-26.51	Pass
3.15	10.54	10.03	0.55	21.12	Average	Neutral	46	-24.88	Pass

Note: The results above show only the worst case.

10.2 Channel Separation (Bluetooth BDR/EDR)

Requirement(s):

Spec	Item	Requirement	Applicable
47 CFR §15.247 (e) RSS-210 (A2.6)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.	☒

Test Setup				
Test Procedure	DA 00-705 Measurement Guidelines for Frequency Hopping Spread Spectrum Systems Channel Separation procedure - The EUT must have its hopping function enabled. - Span = wide enough to capture the peaks of two adjacent channels - Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span - Video (or Average) Bandwidth (VBW) ≥ RBW. - Detector = Peak. - Trace mode = max hold. - Use the marker-delta function to determine the separation between the peaks of the adjacent channels.			
Test Date	06/22/2016	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
Channel Separation	≥1% Span	≥ RBW	-	PK	Auto	Maxhold	-

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

Configuration : Bluetooth Mode , BDR Mode

Channel	Channel Frequency (MHz)	Channel Separation (kHz)	2/3 20dB Bandwidth (kHz)	Pass/Fail
Low	2402	1178	613	Pass
Mid	2441	1000	615	Pass
High	2480	992	614	Pass

Configuration : Bluetooth Mode , EDR Mode

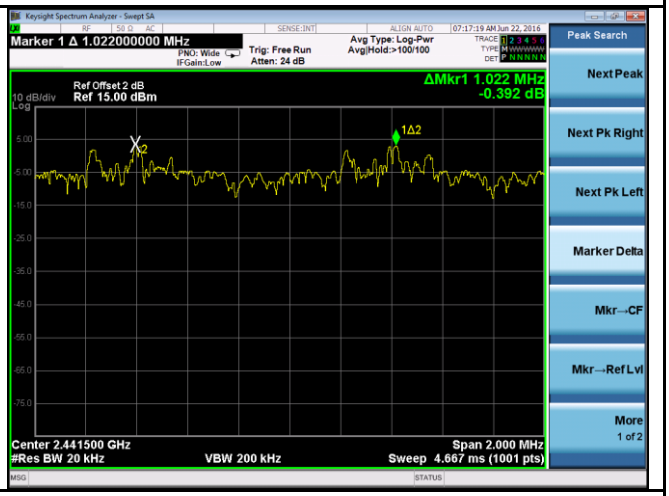
Channel	Channel Frequency (MHz)	Channel Separation (kHz)	2/3 20dB Bandwidth (kHz)	Pass/Fail
Low	2402	1006	892	Pass
Mid	2441	1022	912	Pass
High	2480	943	888	Pass

Channel Separation Test Plot (Bluetooth BDR/EDR)

Channel Separation-BDR 2402MHz

Channel Separation-EDR 2402MHz

Channel Separation-BDR 2441MHz



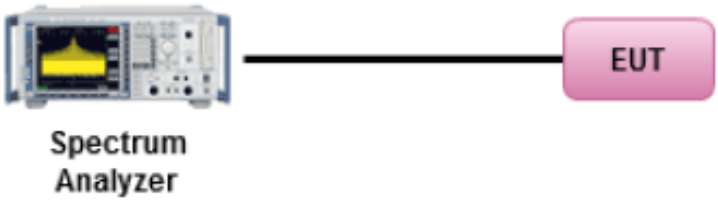
Channel Separation-EDR 2441MHz

Channel Separation-BDR 2480MHz

Channel Separation-EDR 2480MHz

10.3 20dB and 99% Occupied Bandwidth (Bluetooth BDR/EDR)

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247	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.	☒
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	20dB Emission bandwidth measurement procedure - Set RBW ≥ 1% of 20dB Bandwidth - Set the video bandwidth (VBW) ≥ 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. 99% bandwidth measurement 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	06/18/2016 – 06/22/2016	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	23oC 47% 1019mbar
Remark	-			
Result	☐ Pass ☐ Fail			

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

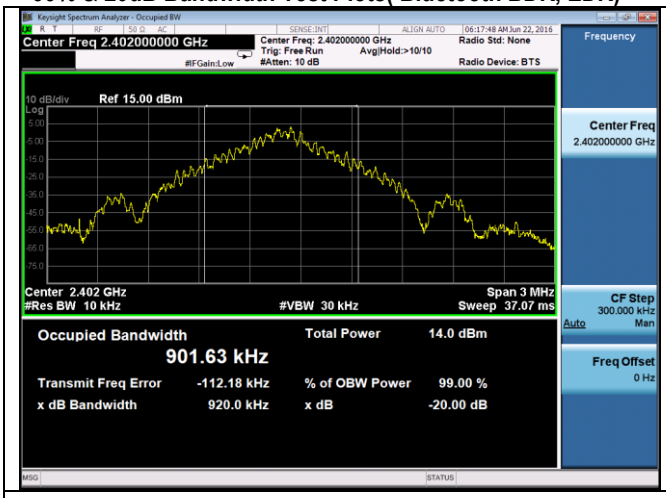
Configuration : Bluetooth mode , BDR Mode

Channel	Channel Frequency (MHz)	OBW		2/3 20dB Bandwidth (kHz)
		99% (KHz)	20dB(KHz)	
Low	2402	901	920	613
Mid	2441	903	923	615
High	2480	900	921	614

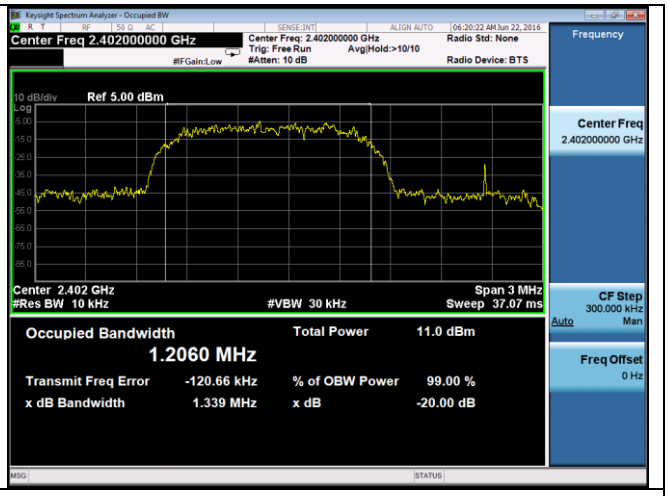
Configuration : Bluetooth mode , EDR mode

Channel	Channel Frequency (MHz)	OBW		2/3 20dB Bandwidth (kHz)
		99%(kHz)	20dB(kHz)	
Low	2402	1206	1339	892
Mid	2441	1206	1369	912
High	2480	1206	1332	888

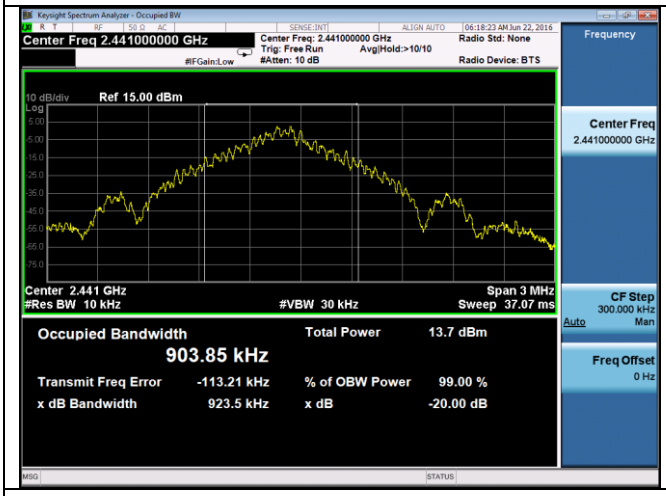
99% & 20dB Bandwidth Test Plots(Bluetooth BDR, EDR)



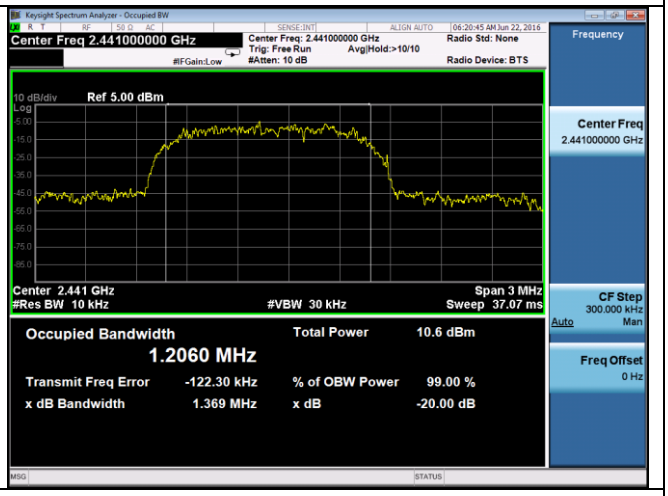
99% and 20dB BW –Bluetooth BDR 2402MHz



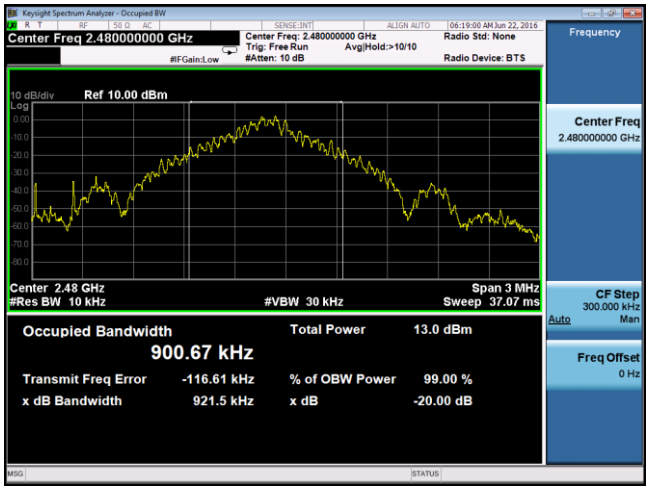
99% and 20dB BW –Bluetooth EDR 2402MHz



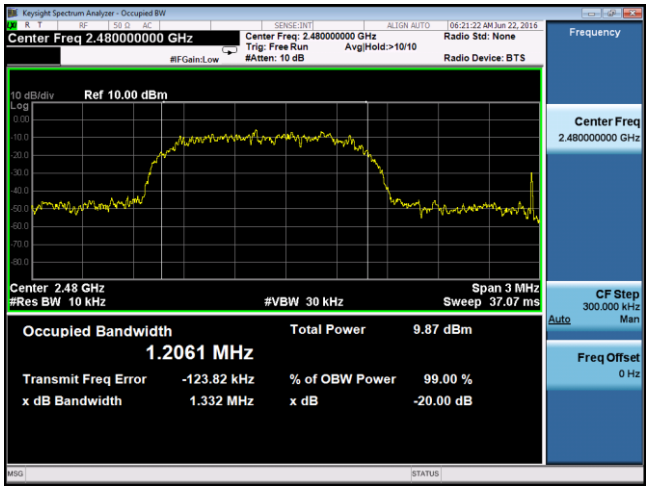
99% and 20dB BW –Bluetooth BDR 2441MHz



99% and 20dB BW –Bluetooth EDR 2441MHz



99% and 20dB BW –Bluetooth BDR 2480MHz

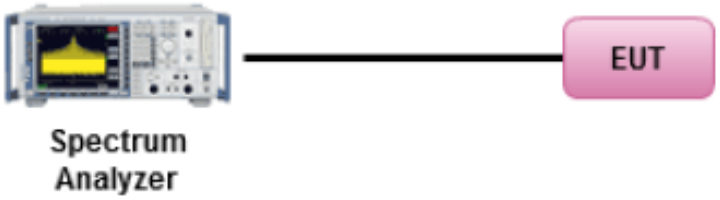


99% and 20dB BW –Bluetooth EDR 2480MHz

10.4 Number of Hopping Channel (Bluetooth BDR/EDR)

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS247 (5.1.5)	For frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: below 1 Watt (inclusive).	☒

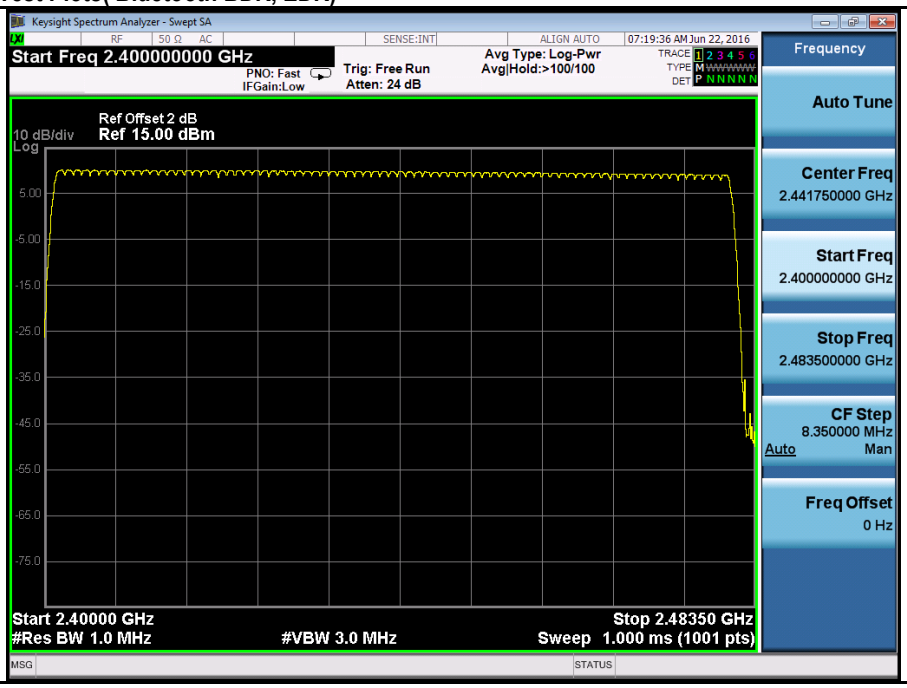
Test Setup			
Procedure	Number of hopping frequencies procedure 1. The EUT must have its hopping function enabled 2. Span = the frequency band of operation. 3. Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span. 4. Video (or Average) Bandwidth (VBW) ≥ RBW. 5. Detector = peak. 6. Sweep time = auto couple. 7. Trace mode = max hold. 8. Allow trace to fully stabilize. 9. Save the plot		
Test Date	06/18/2016 – 06/22/2016	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

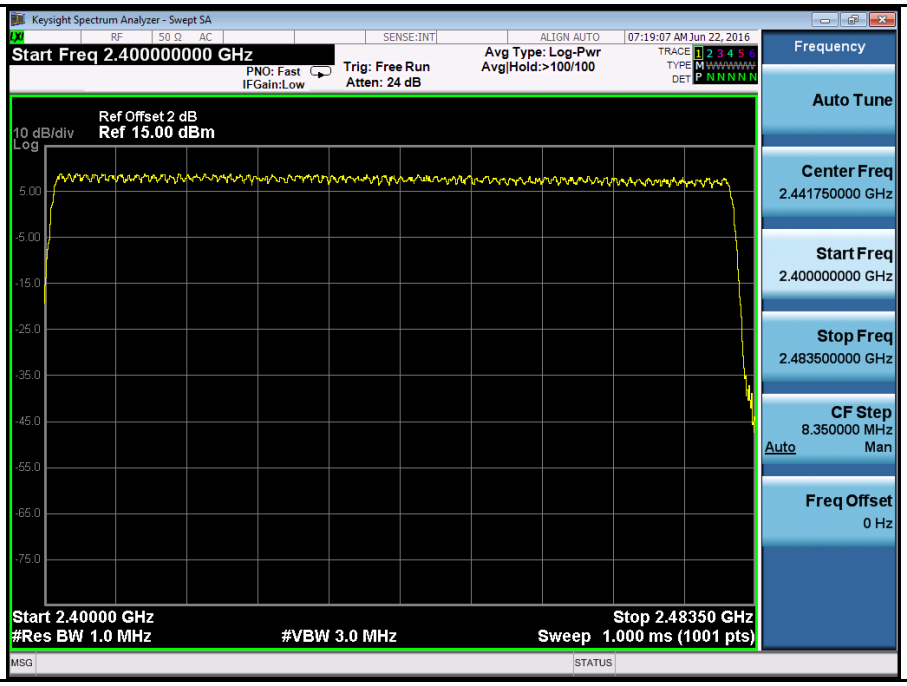
Test was done by Chen Ge at RF test site.

Channel Number	Limit	Pass/Fail
79	>15	Pass

Hopping Channel Test Plots(Bluetooth BDR, EDR)



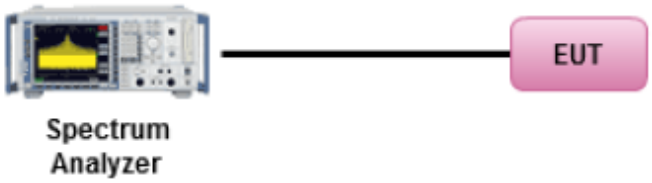
BDR – 79 Channels



EDR – 79 Channels

10.5 Time of Occupancy (Bluetooth BDR/EDR)

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS247 (5.1.5)	Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 non-overlapping 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 which use fewer than 75 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions.	☒
Test Setup		
Test Procedure	DA 00-705 Measurement Guidelines for Frequency Hopping Spread Spectrum Systems Channel Separation procedure - The EUT must have its hopping function enabled. - Span = zero span - centered on a hopping channel - RBW = 1 MHz; VBW ≥ RBW - Sweep = as necessary to capture the entire dwell time per hopping channel. - Detector = Peak. - Trace mode = max hold. - If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.	

Test Date	06/18/2016 – 06/22/2016	Environmental condition	Temperature 21ºC Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	DH5 is the worst case Dwell Time=Pulse time*(1600/6/79)*31.6s		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

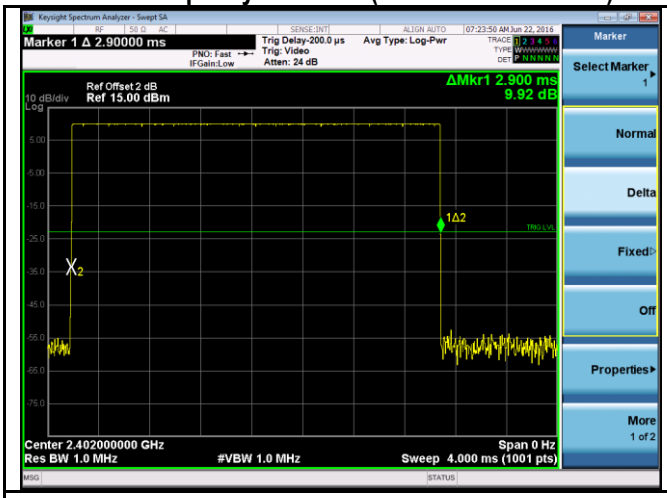
Bluetooth BDR Test Mode

Channel	Channel Frequency (MHz)	On Time (mSec)	Dwell Time (Sec)	Limit (Sec)
Low	2402	2.90	0.30	0.4
Mid	2441	2.90	0.30	0.4
High	2480	2.90	0.30	0.4

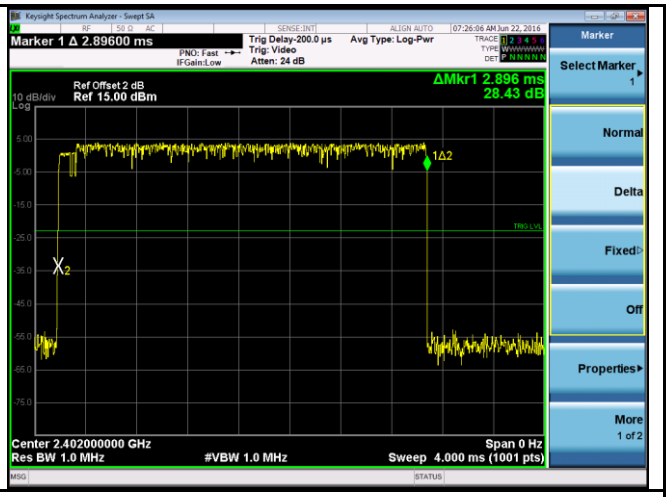
Bluetooth EDR Test Mode

Channel	Channel Frequency (MHz)	On Time (mSec)	Dwell Time (Sec)	Limit (Sec)
Low	2402	2.89	0.30	0.4
Mid	2441	2.90	0.30	0.4
High	2480	2.90	0.30	0.4

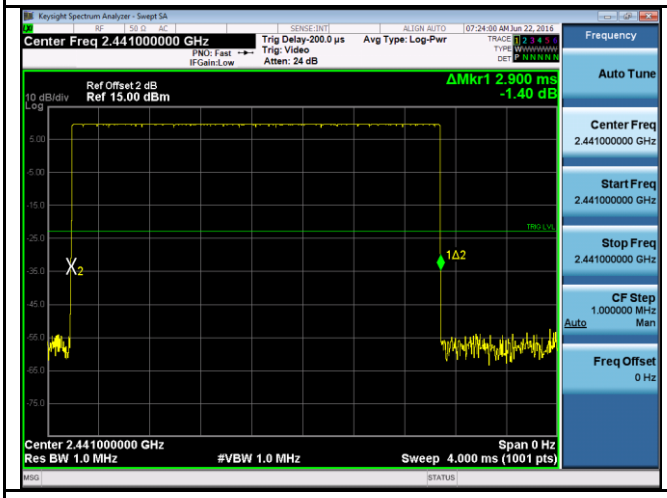
Time of Occupancy Test Plot (Bluetooth BDR/EDR)



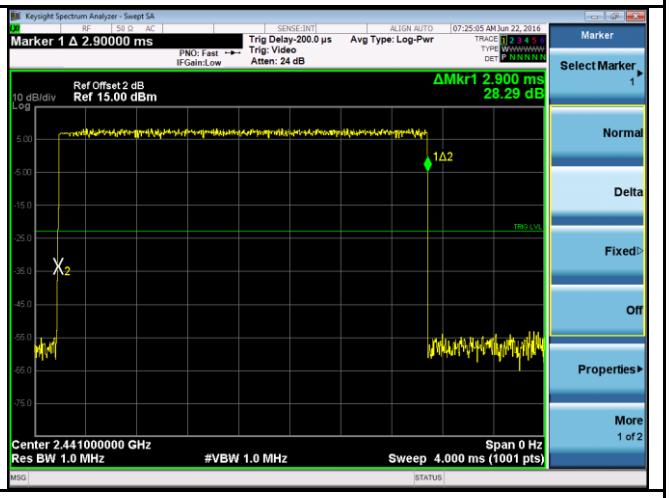
BDR Low Channel (On-Time)



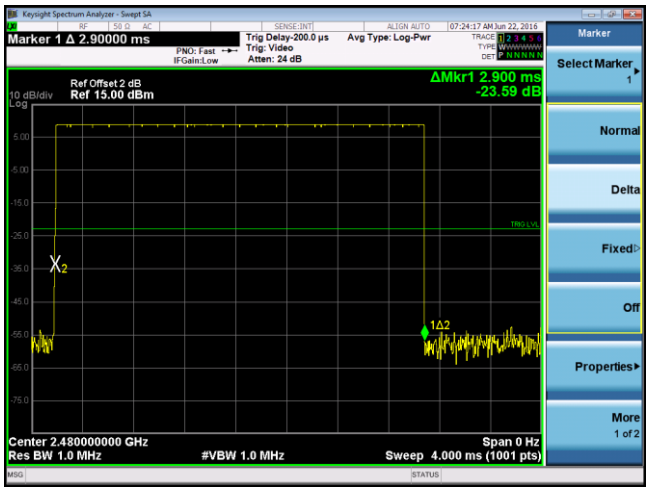
EDR Low Channel (On-Time)



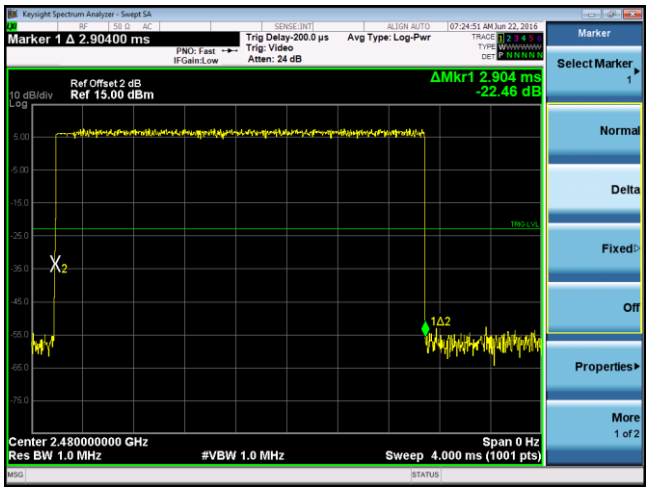
BDR Middle Channel (On-Time)



EDR Middle Channel (On-Time)



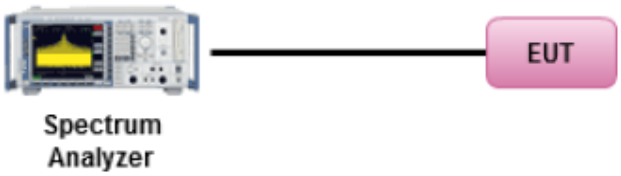
BDR High Channel (On-Time)



EDR High Channel (On-Time)

10.6 Peak Output Power (Bluetooth BDR/EDR)

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	a)	For frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: below 1 Watt (inclusive).	☒
	b)	Power reduction (antenna gain > 6dBi)	☐
§ 15.247		Frequency hopping systems operated in 2400-2483.5MHz with output power not greater than 125mW, the intervals of hopping channel carrier frequencies shall not be less than 25kHz or two thirds of the 20dB bandwidth of the hopping channel, whichever is greater.	☐
Test Setup			
Test Procedure	Maximum output power measurement procedure - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel. - RBW > 20 dB bandwidth of the emission being measured; - VBW ≥ RBW. - Detector = peak. - Sweep time = auto couple. - Trace mode = max hold. - Allow trace to fully stabilize. - Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.		
Test Date	06/18/2016 – 06/22/2016	Environmental condition	Temperature 21ºC Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

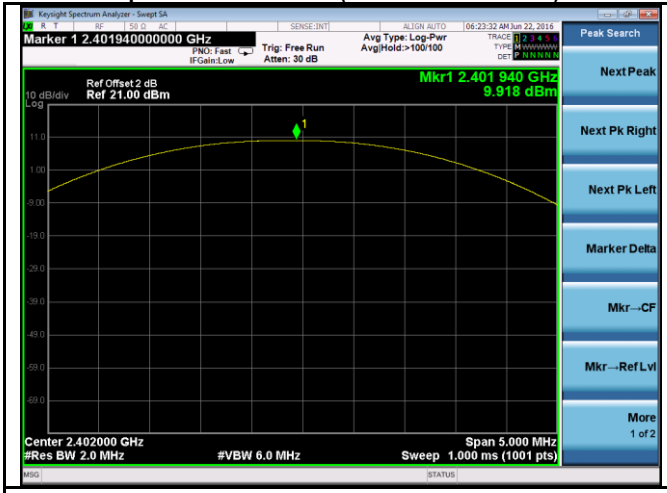
Test Plot ☒ Yes ☐ N/A

Test was done by Chen Ge at RF test site.

Output Power measurement results

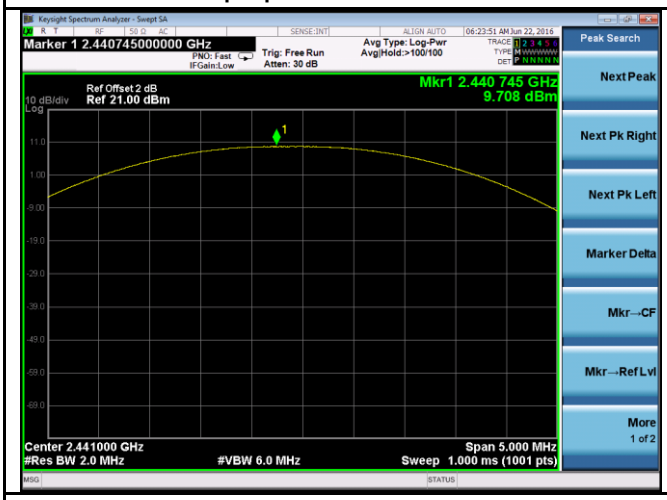
Type	Freq (MHz)	Test mode	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	2402	Bluetooth BDR	Low	9.24	≤30	Pass
	2441		Mid	8.84	≤30	Pass
	2480		High	8.15	≤30	Pass
	2402	Bluetooth EDR	Low	9.24	≤30	Pass
	2441		Mid	8.84	≤30	Pass
	2480		High	8.15	≤30	Pass

Peak Output Power Test Plot (Bluetooth BDR/EDR)



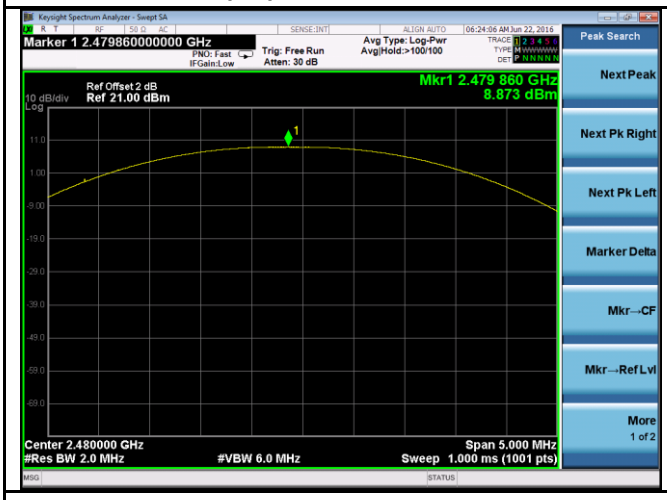
Output power - BDR 2402MHz

Output power - EDR 2402MHz



Output power - BDR 244MHz

Output power - EDR 2441MHz



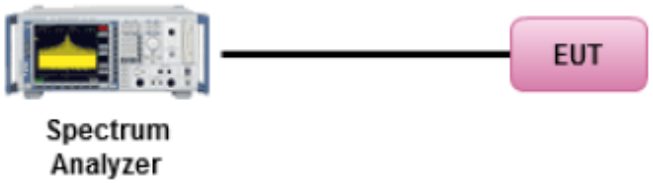
Output power - BDR 2480MHz

Output power - EDR 2480MHz

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	☒

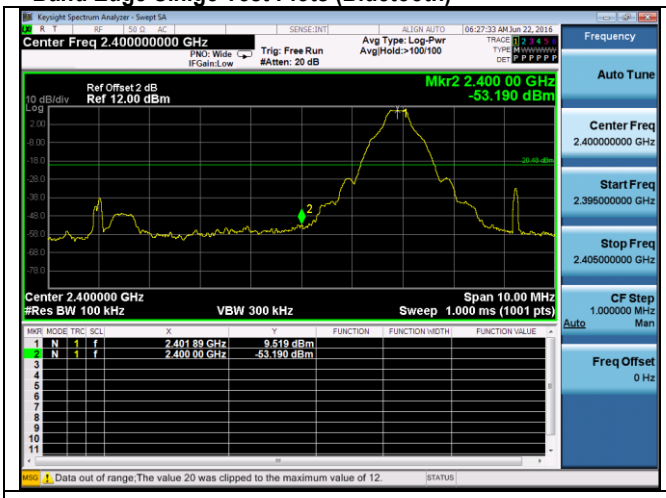
Test Setup				
Test Procedure	Band Edge measurement procedure 1. Set the EUT to maximum power setting and enable the EUT transmit continuously. 2. Band edge emissions must be at least 30 dB down from the highest emission level within the authorized band as a measured. The attenuation shall be be 30 dB instead of 20 dB when Peak 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	09/09/2015	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22ºC 46% 1020mbar
Remark	-			
Result	☒ Pass ☐ Fail			

Test Data ☐ Yes ☒ N/A

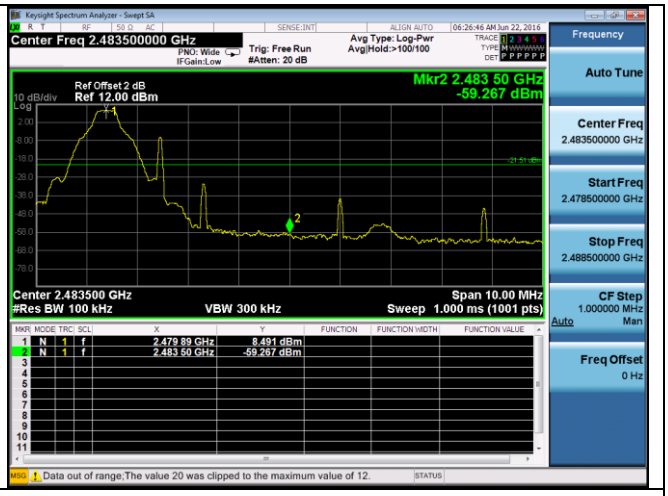
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

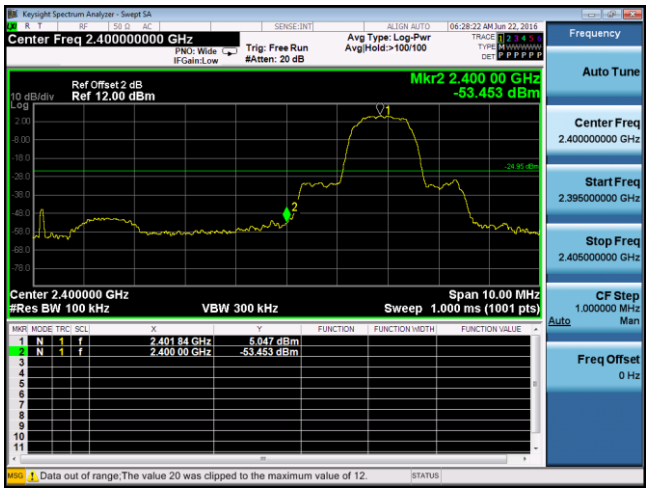
Band Edge Sinlge Test Plots (Bluetooth)



Band Edge-Single-BDR 2402MHz



Band Edge-Single-BDR 2480MHz

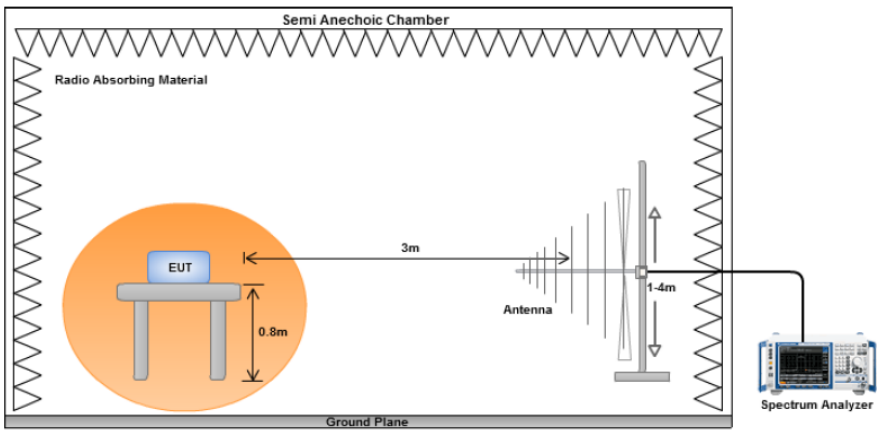


Band Edge-Single-EDR 2402MHz

Band Edge-Single-EDR 2480MHz

10.8 Transmitter Radiated Spurious Emissions Below 1GHz

Requirement(s):

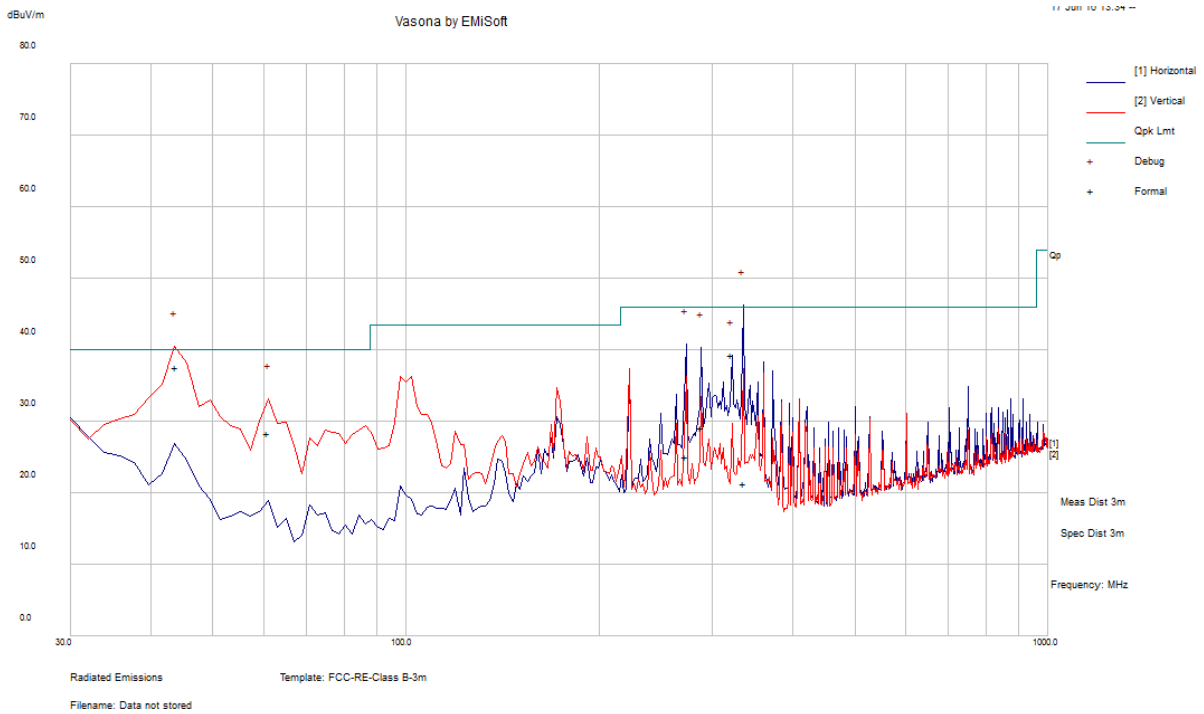
<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.247(d), RSS247(5.5)</td><td>a)</td><td>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified 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></td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 
</td></tr>
<tr><td>Procedure</td><td colspan="3">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.</td></tr>
<tr><td>Remark</td><td colspan="3">The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.</td></tr>
<tr><td>Result</td><td colspan="3">☒ Pass ☐ Fail</td></tr>
</table>

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Radiated Emission Test Results (Below 1GHz) (Omnidirectional Antenna)

Test specification:	Radiated Spurious Emissions (30MHz – 1000MHz)			
Environmental Conditions:	Temp(°C):	22	Result :	☒ Pass ☐ Fail
	Humidity (%):	37		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Chen Ge			
Test Date:	06/28/2016			
Remarks:	BDR 2441MHz			

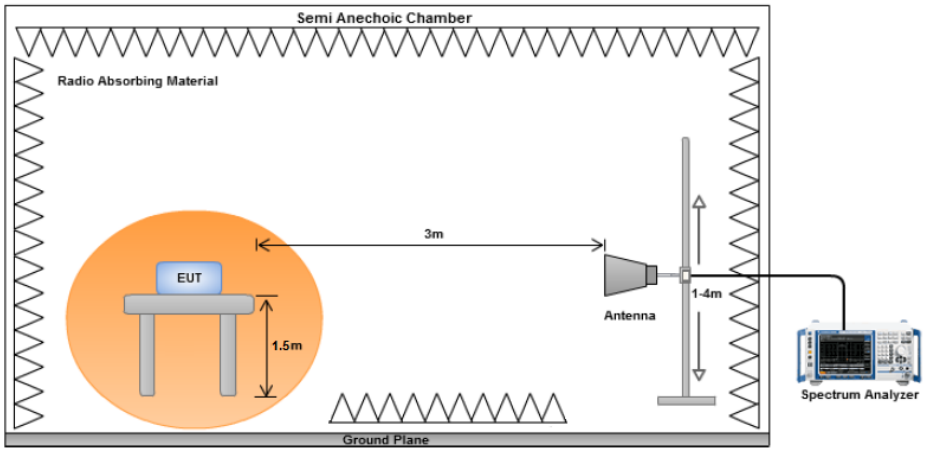


Quasi Max Measurement

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
43.78	62.91	0.99	-26.35	37.55	Quasi Max	V	103	273	40	-2.45	Pass
335.28	43.6	2.79	-25.15	21.25	Quasi Max	H	154	144	46.02	-24.77	Pass
273.10	48.76	2.53	-26.31	24.99	Quasi Max	H	102	251	46.02	-21.03	Pass
288.78	52.82	2.58	-26.32	29.08	Quasi Max	H	104	62	46.02	-16.94	Pass
321.76	61.79	2.73	-25.25	39.27	Quasi Max	H	100	348	46.02	-6.75	Pass
60.86	58.23	1.21	-31.15	28.28	Quasi Max	V	107	147	40	-11.72	Pass

10.9 Transmitter Radiated Spurious Emissions > 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS247(5.5)	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		The EUT was scanned up to 26GHz. 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

Test was done by Chen Ge at 3m and 10m chamber.

Radiated Emission Test Results

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
7202.74	40.13	7.36	-11.59	35.9	Peak Max	V	202	267	74	-38.1	Pass
9607.57	39.81	7.89	-10.42	37.28	Peak Max	H	163	227	74	-36.72	Pass
4803.41	39.97	7.04	-17.29	29.71	Peak Max	H	190	0	74	-44.29	Pass
7202.74	27.76	7.36	-11.59	23.54	Average Max	V	202	267	54	-30.46	Pass
9607.57	28.19	7.89	-10.42	25.66	Average Max	H	163	227	54	-28.34	Pass
4803.41	27.47	7.04	-17.29	17.21	Average Max	H	190	0	54	-36.79	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
7324.23	39.86	7.34	-11.53	35.66	Peak Max	V	161	146	74	-38.34	Pass
9766.40	39.58	7.95	-10.3	37.24	Peak Max	V	99	210	74	-36.76	Pass
4881.08	40.34	7.06	-17.07	30.33	Peak Max	H	167	248	74	-43.67	Pass
7324.23	27.6	7.34	-11.53	23.4	Average Max	V	161	146	54	-30.6	Pass
9766.40	27.19	7.95	-10.3	24.85	Average Max	V	99	210	54	-29.16	Pass
4881.08	27.74	7.06	-17.07	17.72	Average Max	H	167	248	54	-36.28	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
7440.37	39.88	7.32	-11.44	35.76	Peak Max	H	217	81	74	-38.24	Pass
9922.34	39.84	8.02	-10.16	37.7	Peak Max	V	102	177	74	-36.3	Pass
4959.89	39.74	7.08	-16.89	29.93	Peak Max	H	182	145	74	-44.07	Pass
7440.37	27.64	7.32	-11.44	23.51	Average Max	H	217	81	54	-30.49	Pass
9922.34	27.66	8.02	-10.16	25.52	Average Max	H	178	8	54	-28.48	Pass
4959.89	27.99	7.08	-16.89	18.18	Average Max	H	182	145	54	-35.82	Pass

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
9606.07	39.27	7.89	-10.42	36.73	Peak Max	H	101	194	74	-37.27	Pass
7203.22	39.34	7.36	-11.59	35.11	Peak Max	V	210	164	74	-38.89	Pass
4803.48	39.39	7.04	-17.29	29.13	Peak Max	H	165	274	74	-44.87	Pass
9606.07	27.78	7.89	-10.42	25.24	Average Max	H	101	194	54	-28.76	Pass
7203.22	27.61	7.36	-11.59	23.39	Average Max	V	210	164	54	-30.61	Pass
4803.48	27.23	7.04	-17.29	16.97	Average Max	H	165	274	54	-37.03	Pass

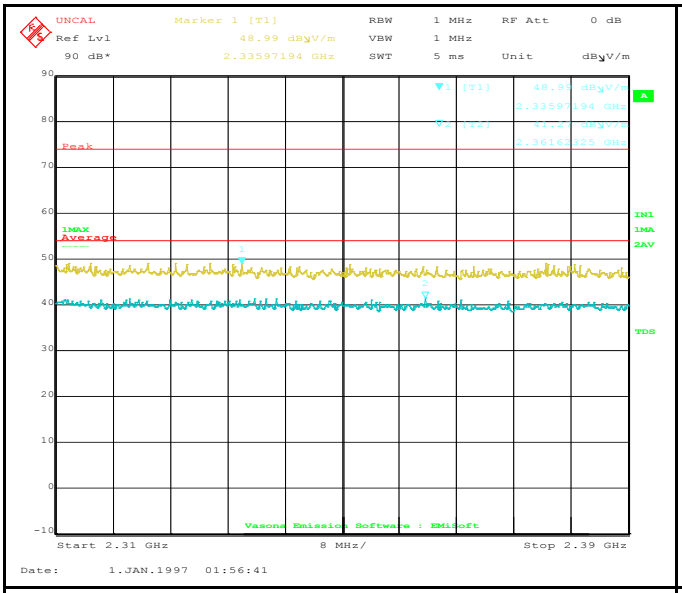
EDR – 2441MHz

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
9766.80	39.7	7.95	-10.3	37.36	Peak Max	V	167	290	74	-36.64	Pass
7322.86	39.31	7.34	-11.53	35.12	Peak Max	V	156	124	74	-38.88	Pass
4881.92	40.31	7.06	-17.07	30.29	Peak Max	H	203	105	74	-43.71	Pass
9766.80	27.42	7.95	-10.3	25.08	Average Max	V	167	290	54	-28.92	Pass
7322.86	27.54	7.34	-11.53	23.35	Average Max	V	156	124	54	-30.65	Pass
4881.92	27.71	7.06	-17.07	17.7	Average Max	H	203	105	54	-36.3	Pass

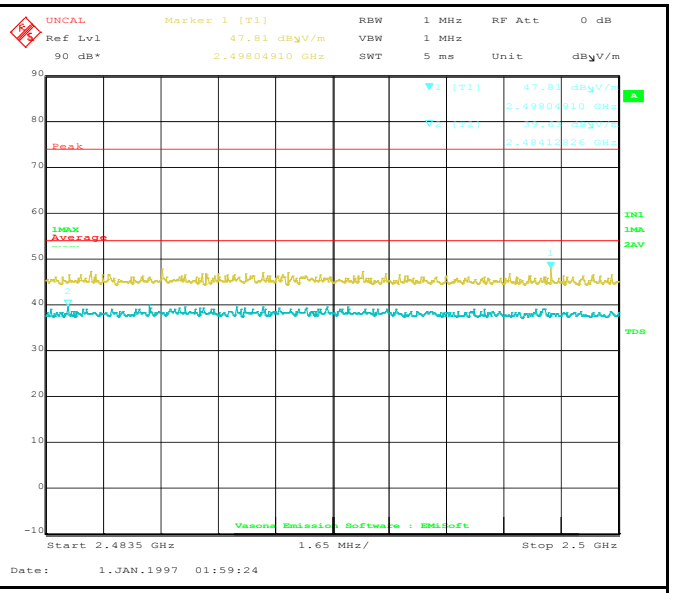
EDR – 2480MHz

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
9921.94	39.67	8.02	-10.16	37.53	Peak Max	V	196	260	74	-36.47	Pass
7440.64	39.24	7.32	-11.44	35.12	Peak Max	H	178	290	74	-38.88	Pass
4958.64	38.7	7.08	-16.89	28.89	Peak Max	H	244	177	74	-45.11	Pass
9921.94	27.67	8.02	-10.16	25.53	Average Max	V	196	260	54	-28.47	Pass
7440.64	27.53	7.32	-11.44	23.41	Average Max	H	178	290	54	-30.59	Pass
4958.64	26.47	7.08	-16.89	16.66	Average Max	H	244	177	54	-37.35	Pass

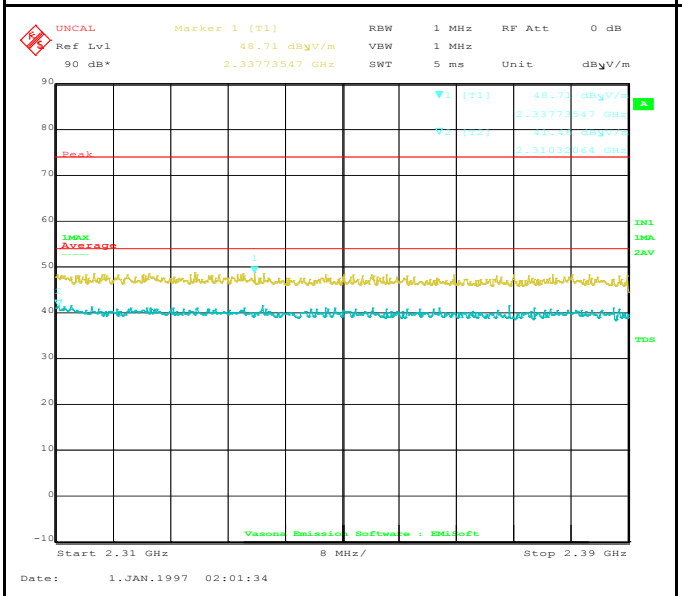
Restricted Band Test plot (Bluetooth BDR/EDR)



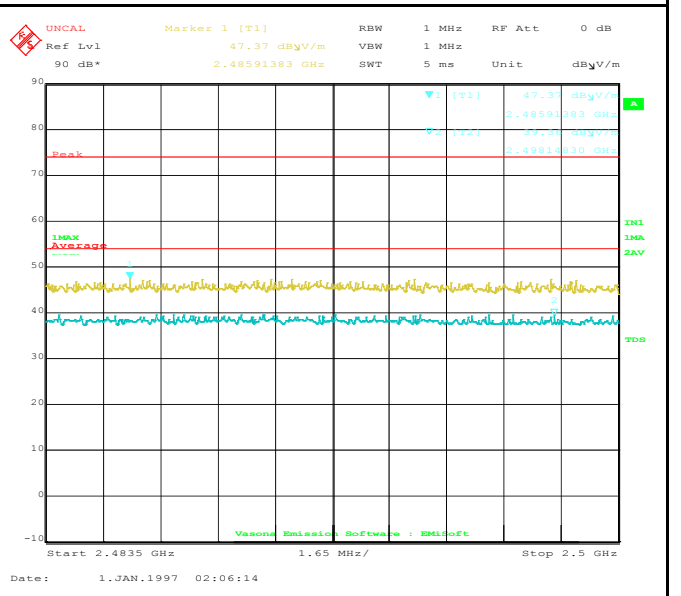
Restricted Band BDR 2402MHz



Restricted Band BDR 2480MHz



Restricted Band EDR 2402MHz



Restricted Band EDR 2480MHz

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	06/08/2016	1 Year	06/08/2017	☑
CHASE LISN	MN2050B	1018	08/07/2015	1 Year	08/07/2016	☑
Radiated Emissions						
R & S Receiver	ESIB 40	1018	08/07/2015	1 Year	08/07/2016	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2015	1 Year	08/12/2016	☑
Horn Antenna (1GHz~26GHz)	3115	100059	08/25/2015	1 Year	08/25/2016	☑
Pre-Amplifier	LPA-6-30	11140711	02/10/2016	1 Year	02/10/2017	☑
3 Meters SAC	3M	N/A	08/08/2015	1 Year	08/08/2016	☑
10 Meters SAC	10M	N/A	09/05/2015	1 Year	09/05/2016	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	08/20/2015	1 Year	08/20/2016	☑
R & S Receiver	ESIB 40	100179	06/08/2016	1 Year	06/08/2017	☑
ETS-Lingren USB RF Power Sensor	7002-006	10SL0190	09/03/2015	1 Year	09/03/2016	☑

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