

RF TEST REPORT



Report No.: FCC IC_SL17060501-ZBR-021_DSS_Rev2.0
Supersede Report No.:

Applicant	:	Zebra Technologies Corporation
Host Product Name	:	Mobile Thermal Printer
Host Model No.	:	ZQ310 and ZQ320
Module Model No.	:	ZQ3BT
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	:	I28-ZBRZQ3BT
IC ID	:	3798B- ZBRZQ3BT
Dates of test	:	07/22/2017 – 08/16/2017
Issue Date	:	08/18/2017
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification ☒		
Equipment did not comply with the specification ☐		

This Test Report is Issued Under the Authority of:

Rachana Khanduri	Chen Ge
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
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Laboratory Introduction

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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 IC_RF_SL17060501_ZBR-021_DSS	None	Original	08/08/2017
FCC IC_RF_SL17060501_ZBR-021_DSS_Rev1.0	1.0	Update Radiated Emissions data	08/16/2017
FCC IC_RF_SL17060501_ZBR-021_DSS_Rev2.0	2.0	Update Radiated Emissions data	08/18/2017

2 Executive Summary

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

Company: Zebra Technologies Corporation
Host Product Name: Mobile Thermal Printer
Host Model No.: ZQ310 and ZQ320
Module Model No. ZBRZQ3BT

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	Zebra Technologies Corp.
Applicant Address	3 Overlook Point, Lincolnshire, IL 60069
Manufacturer Name	Zebra Technologies Corp.
Manufacturer Address	3 Overlook Point, Lincolnshire, IL 60069

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

Host Product Name	Mobile Thermal Printer
Host Model No.	ZQ310 and ZQ320
Module Model No.	ZQ3BT
Trade Name	Zebra
Serial No.	XXZFJ170700353
Input Power	100-240VAC_47/63Hz
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Date of EUT received	07/28/2017
Equipment Class/ Category	FHSS
Port/Connectors	USB
Remark	NONE

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	Chip
Antenna Gain	1.69 dBi
Antenna Connector Type	-

6.3 EUT test modes/configuration Description

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

6.4 EUT Photos-External



EUT -Top View



EUT -Bottom View with battery



EUT -Bottom View without battery



EUT- Front View



EUT - Rear View



EUT - Left Side View



EUT – Right Side View

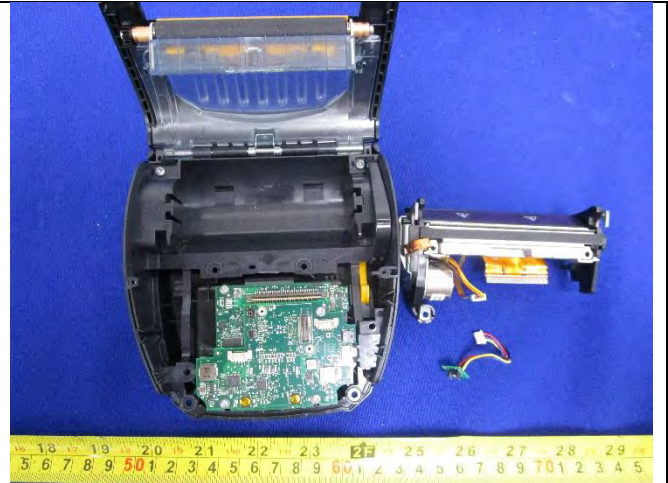


EUT - Battery View

6.5 EUT Photos – Internal



PCBA Open Case View 1



PCBA Open Case View 2



EUT PCBA Close-Up View



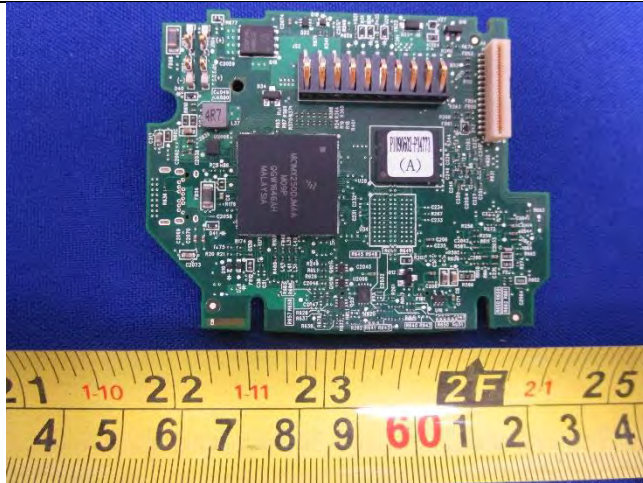
PCBA – Top View



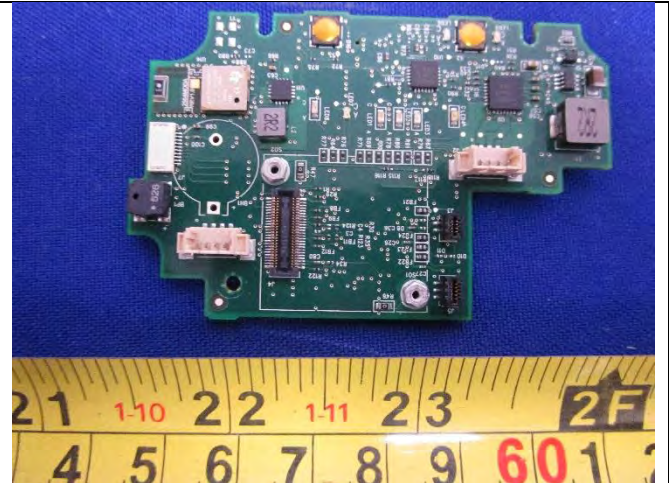
PCBA A and B Top View



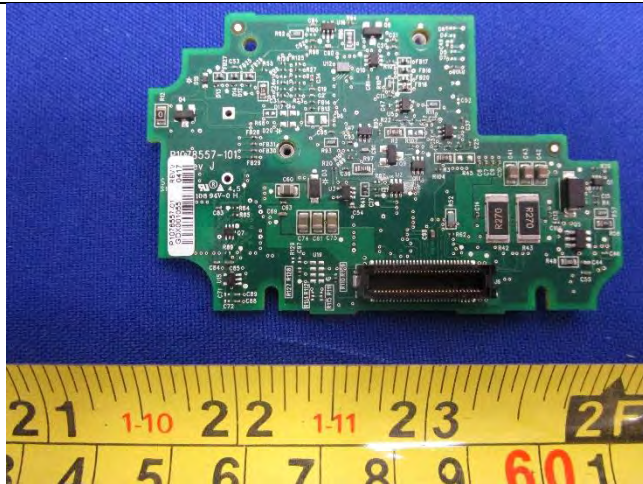
PCBA A- Top View



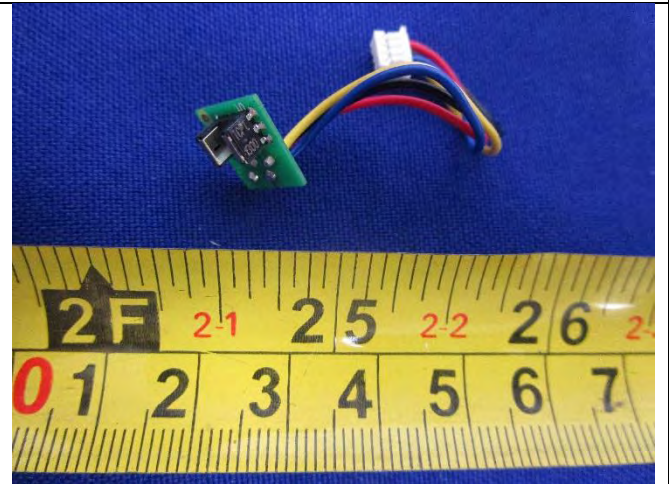
PCBA A – Bottom View



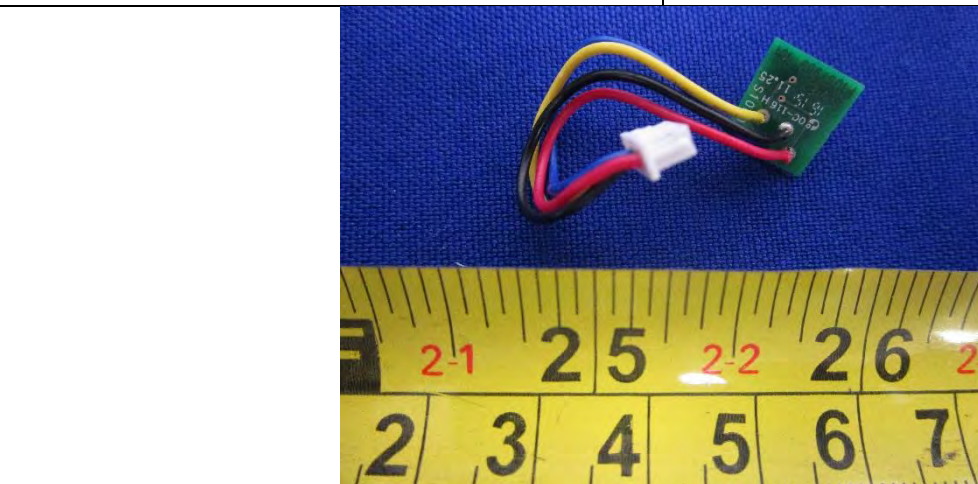
Main PCBA -Top View



Main PCBA- Bottom View



PCBA B – Top View



PCBA B – Bottom View

6.6 EUT Test Setup Photos



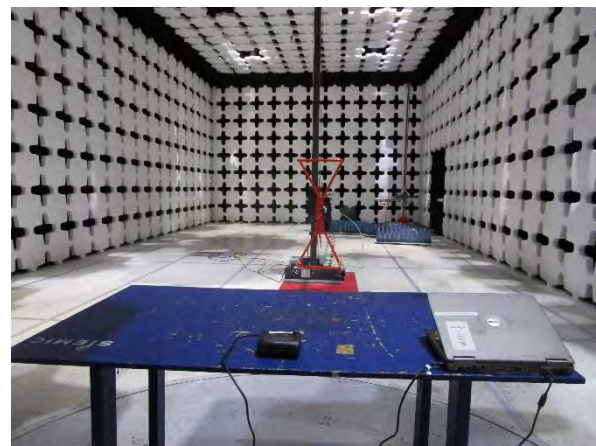
AC Line Conducted Emissions – Front View



AC Line Conducted Emissions – Rear View



Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View(EUT vertical)



Radiated Emissions (>1GHz) – Rear View(EUT vertical)



Radiated Emissions (>1GHz) – Front View (EUT horizontal)



Radiated Emissions (>1GHz) – Rear View(EUT horizontal)

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	ThinkPad T420s	N/A	Lenovo	-

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	I/O Port	Laptop	USB	2	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Zebra Toolbox	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

EIS 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
		IC	RSS247 (5.1.5)	IC	-	☐ N/A
20dB Occupied Bandwidth		FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass
		IC	RSS247 (5.1.2)	IC	-	☐ N/A
99% Occupied Bandwidth		FCC	15.247(a)(2)	FCC		☒ Pass
		IC	RSS Gen 6.6	IC	RSS Gen Issue 4: 2014 -	☐ N/A
Number of Hopping Channels		FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass
		IC	RSS247 (5.1.5)	IC	-	☐ N/A
Band Edge and Radiated Spurious Emissions		FCC	15.247(d)	FCC	Public Notice DA 00-705	☒ Pass
		IC	RSS247(5.5)	IC	-	☐ N/A
Time of Occupancy		FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	☒ Pass
		IC	RSS247 (5.1.5)	IC	-	☐ N/A
Output Power		FCC	15.247(b)	FCC	Public Notice DA 00-705	☒ Pass
		IC	RSS247 (5.4.2)	IC	-	☐ N/A
Receiver Spurious Emissions		FCC	15.247(d)	FCC	-	☐ Pass
		IC	RSS Gen (7.1)	IC	RSS Gen (7.1)	☒ N/A
Antenna Gain > 6 dBi		FCC	15.247(e)	FCC	Public Notice DA 00-705	☐ Pass
		IC	RSS247 (5.4.6)	IC	-	☒ N/A
Power Spectral Density		FCC	15.247(e)	FCC	Public Notice DA 00-705	☐ Pass
		IC	RSS247 (5.2.2)	IC	-	☒ N/A
Hybrid System Requirement		FCC	15.247(f)	FCC	Public Notice DA 00-705	☐ Pass
		IC	RSS247 (5.3)	IC	-	☒ N/A
Hopping Capability		FCC	15.247(g)	FCC	Public Notice DA 00-705	☒ Pass
		IC	RSS247 (5.1.5)	IC	-	☐ N/A
RF Exposure requirement		FCC	15.247(i)	FCC	Public Notice DA 00-705	☐ Pass
		IC	RSS Gen(3.2)	IC	-	☒ N/A
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

9.1 Conducted Emissions

The test is to measure the conducted emissions to the mains port of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the LISN
- Uncertainty of cables
- Uncertainty due to the mismatches
- Etc, see the below table for details

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
LISN Insertion Loss	0.40	Normal	2	1	0.20
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch LISN - Receiver	0.25	U-Shape	1.414	1	0.1768033
LISN Impedance	2.5	Triangular	2.449	1	1.0208248
Combined Standard Uncertainty					1.928133
Expanded Uncertainty (K=2)					3.856266

The total derived measurement uncertainty is +/- 3.86 dB.

9.2 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					6.0118262

The total derived measurement uncertainty is +/- 6.00 dB.

9.3 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					8.4726

The total derived measurement uncertainty is +/- 8.47 dB.

9.4 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					0.952174

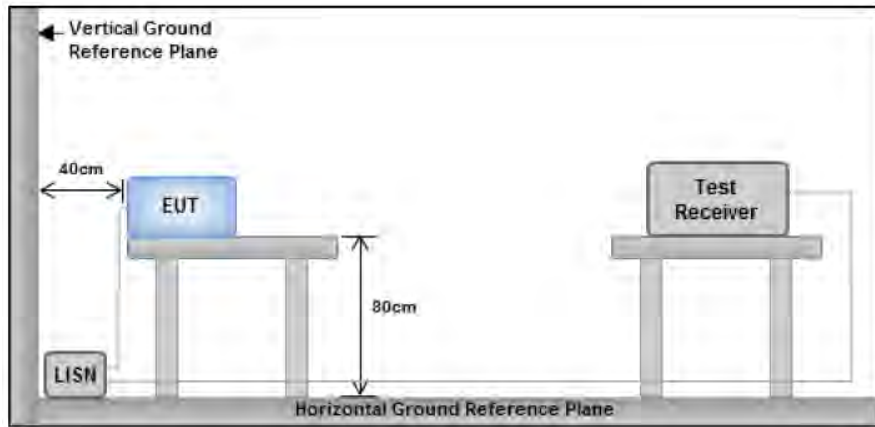
The total derived measurement uncertainty is +/- 0.95 dB.

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 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 120V 60Hz	
Result		☒ Pass ☐ Fail	

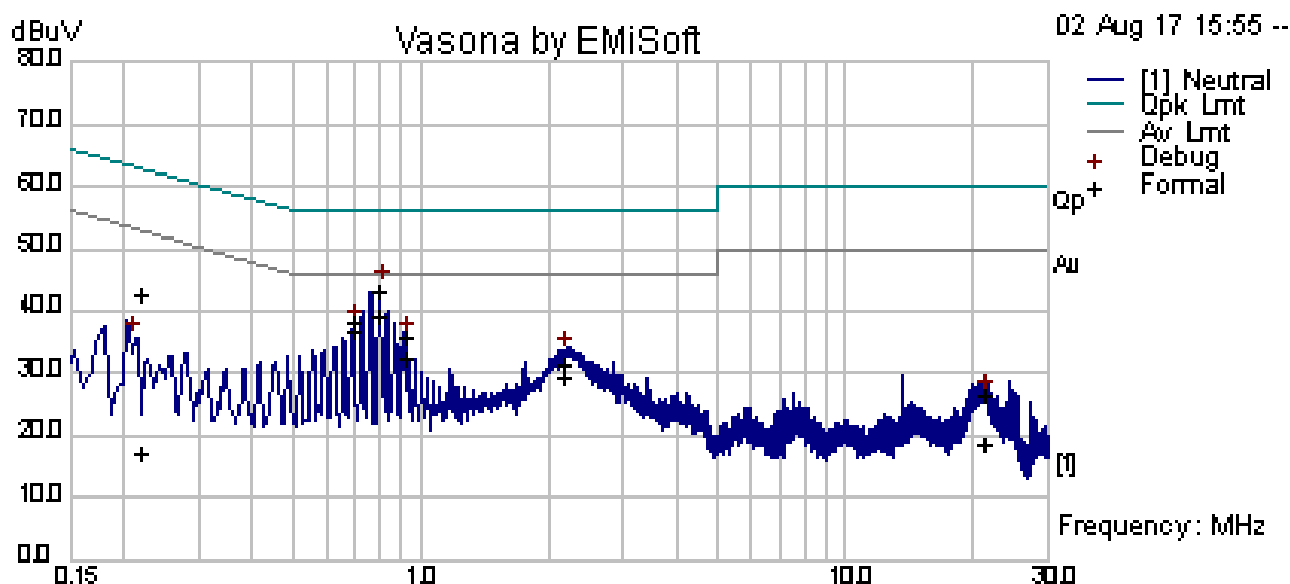
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by *Rachana Khanduri* at *Conducted Emission Test Site*.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	45		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/02/2017			
Remarks	conducted @ Neutral			

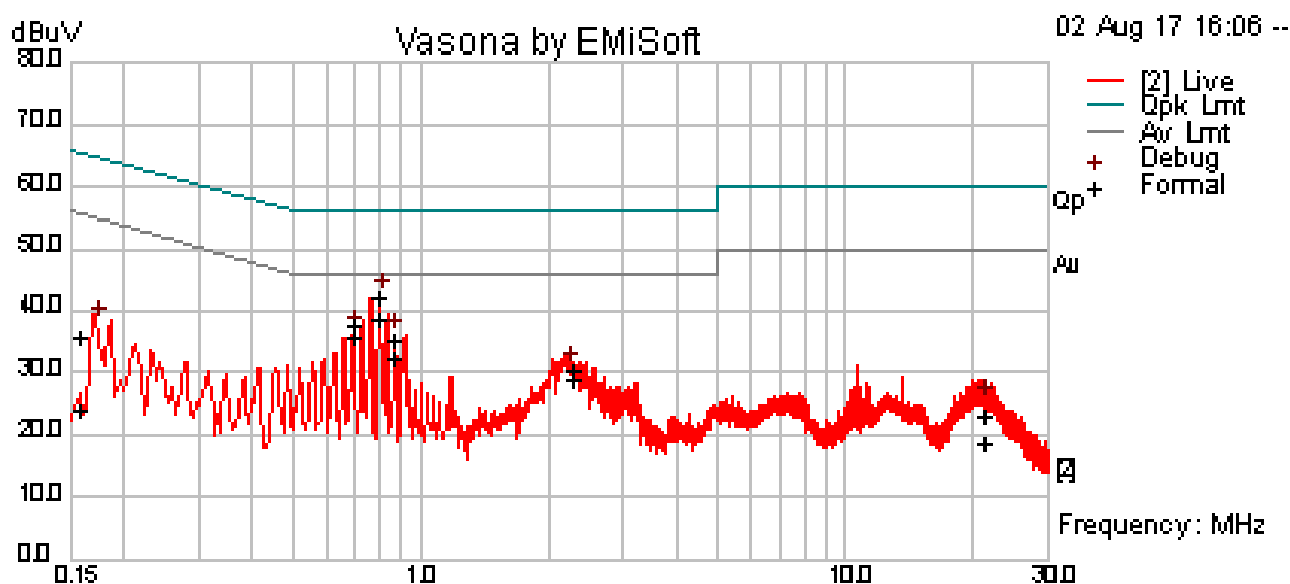


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.80	32.50	10.01	0.55	43.06	Quasi Peak	Neutral	56.00	-12.94	Pass
0.69	26.03	10.01	0.56	36.61	Quasi Peak	Neutral	56.00	-19.39	Pass
0.92	25.49	10.01	0.53	36.04	Quasi Peak	Neutral	56.00	-19.96	Pass
2.17	21.06	10.02	0.50	31.58	Quasi Peak	Neutral	56.00	-24.42	Pass
0.22	31.29	10.00	1.15	42.44	Quasi Peak	Neutral	62.87	-20.43	Pass
21.27	15.85	10.07	0.68	26.60	Quasi Peak	Neutral	60.00	-33.40	Pass
0.80	28.76	10.01	0.55	39.32	Average	Neutral	46.00	-6.68	Pass
0.69	27.66	10.01	0.56	38.23	Average	Neutral	46.00	-7.77	Pass
0.92	21.70	10.01	0.53	32.24	Average	Neutral	46.00	-13.76	Pass
2.17	18.71	10.02	0.50	29.23	Average	Neutral	46.00	-16.77	Pass
0.22	5.83	10.00	1.15	16.98	Average	Neutral	52.87	-35.89	Pass
21.27	8.03	10.07	0.68	18.79	Average	Neutral	50.00	-31.21	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	22	Result:	☒ Pass ☐ Fail
	Humidity (%):	45		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/02/2017			
Remarks	conducted @ Live			



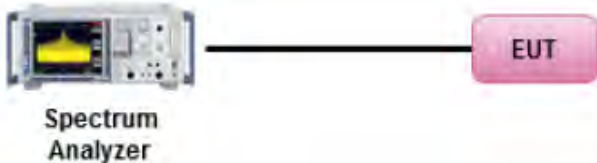
Live Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.80	31.80	10.01	0.55	42.36	Quasi Peak	Live	56.00	-13.64	Pass
0.69	25.47	10.01	0.56	36.04	Quasi Peak	Live	56.00	-19.96	Pass
0.87	24.89	10.01	0.54	35.44	Quasi Peak	Live	56.00	-20.56	Pass
2.27	18.44	10.02	0.50	28.96	Quasi Peak	Live	56.00	-27.04	Pass
0.16	24.34	10.00	1.64	35.98	Quasi Peak	Live	65.57	-29.59	Pass
21.09	12.36	10.07	0.68	23.11	Quasi Peak	Live	60.00	-36.89	Pass
0.80	28.10	10.01	0.55	38.66	Average	Live	46.00	-7.34	Pass
0.69	27.13	10.01	0.56	37.70	Average	Live	46.00	-8.30	Pass
0.87	21.76	10.01	0.54	32.31	Average	Live	46.00	-13.69	Pass
2.27	19.66	10.02	0.50	30.18	Average	Live	46.00	-15.82	Pass
0.16	12.57	10.00	1.64	24.21	Average	Live	55.57	-31.36	Pass
21.09	8.03	10.07	0.68	18.78	Average	Live	50.00	-31.22	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-247 (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 <u>Channel Separation procedure</u> - The EUT must have its hopping function enabled. - Span = wide enough to capture the peaks of two adjacent channels - Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span - Video (or Average) Bandwidth (VBW) $\geq$ 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	08/01/2017	Environmental condition	Temperature 21°C Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by *Rachana Khanduri* at *RF Test Site*.

Configuration : Bluetooth Mode , BDR Mode

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	>2/3 20dB Bandwidth (MHz)	Pass/Fail
Low	2402	1.000	>585.73	Pass
Mid	2441	1.004	>591.47	Pass
High	2480	1.002	>623.53	Pass

Configuration : Bluetooth Mode , EDR Mode

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	>2/3 20dB Bandwidth (MHz)	Pass/Fail
Low	2402	1.002	>0.915	Pass
Mid	2441	1.002	>0.903	Pass
High	2480	1.002	>0.913	Pass

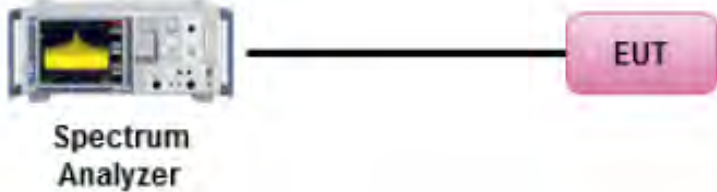
Note: The results of 20dB BW can be found in section 10.3.

Channel Separation Test Plot (Bluetooth BDR/EDR)



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	<u>20dB Emission bandwidth measurement procedure</u> - Set RBW $\geq$ 1% of 20dB Bandwidth - Set the video bandwidth (VBW) $\geq$ 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. <u>99% bandwidth measurement procedure</u> 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	08/01/2017	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 *Rachana Khanduri* at *RF Test Site*.

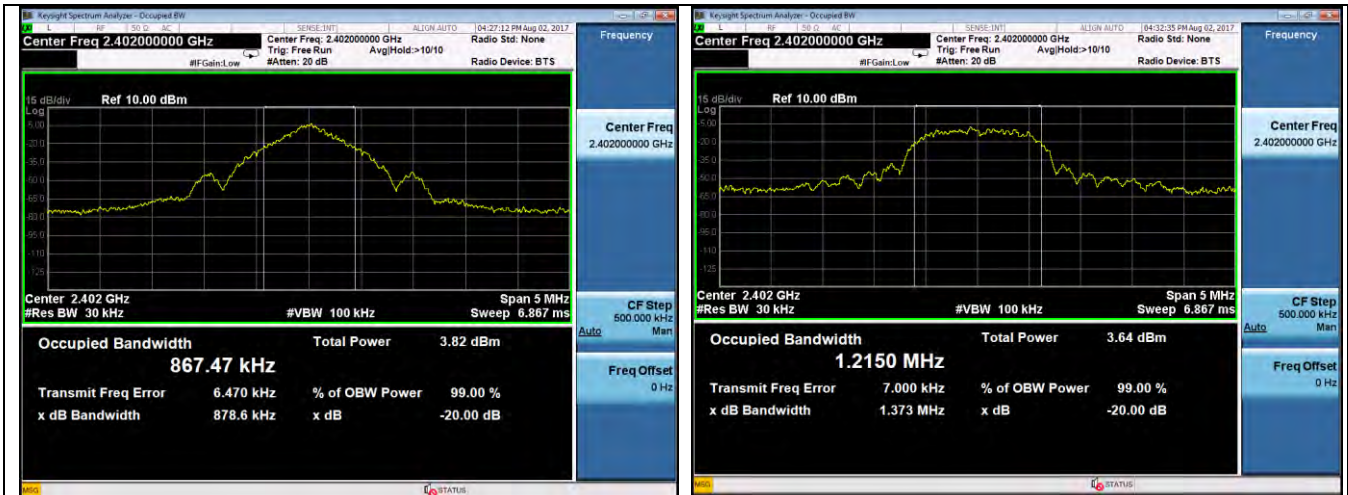
Configuration : Bluetooth mode , BDR Mode

Channel	Channel Frequency (MHz)	OBW		2/3 20dB Bandwidth (KHz)
		99% (KHz)	20dB(KHz)	
Low	2402	867.47	878.60	585.73
Mid	2441	867.30	887.20	591.47
High	2480	877.01	935.30	623.53

Configuration : Bluetooth mode , EDR mode

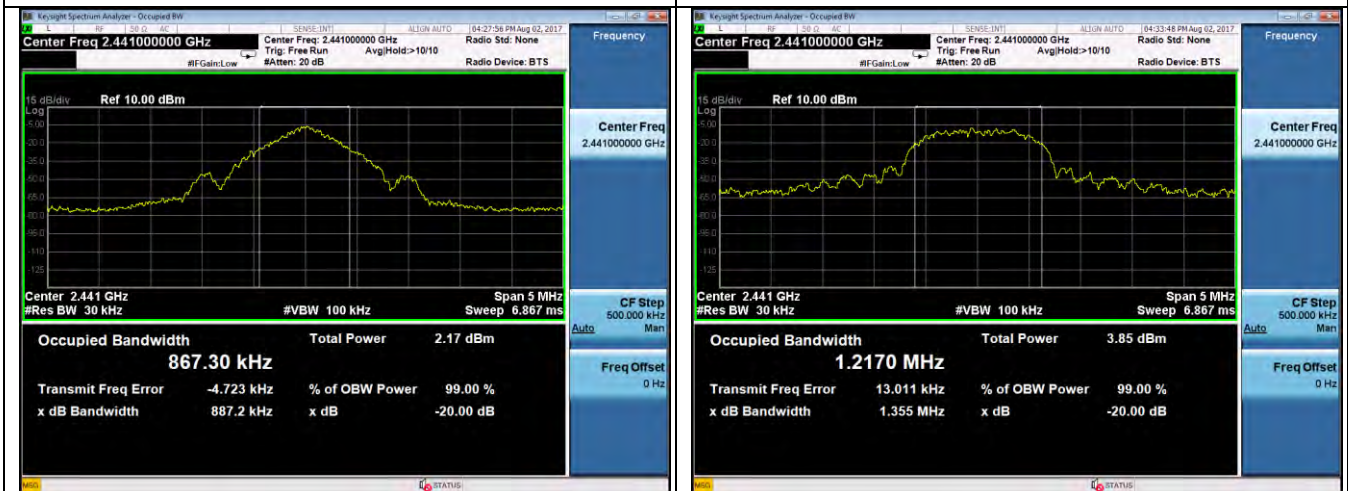
Channel	Channel Frequency (MHz)	OBW		2/3 20dB Bandwidth (MHz)
		99%(MHz)	20dB(MHz)	
Low	2402	1.23	1.373	0.915
Mid	2441	1.23	1.355	0.903
High	2480	1.22	1.369	0.913

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



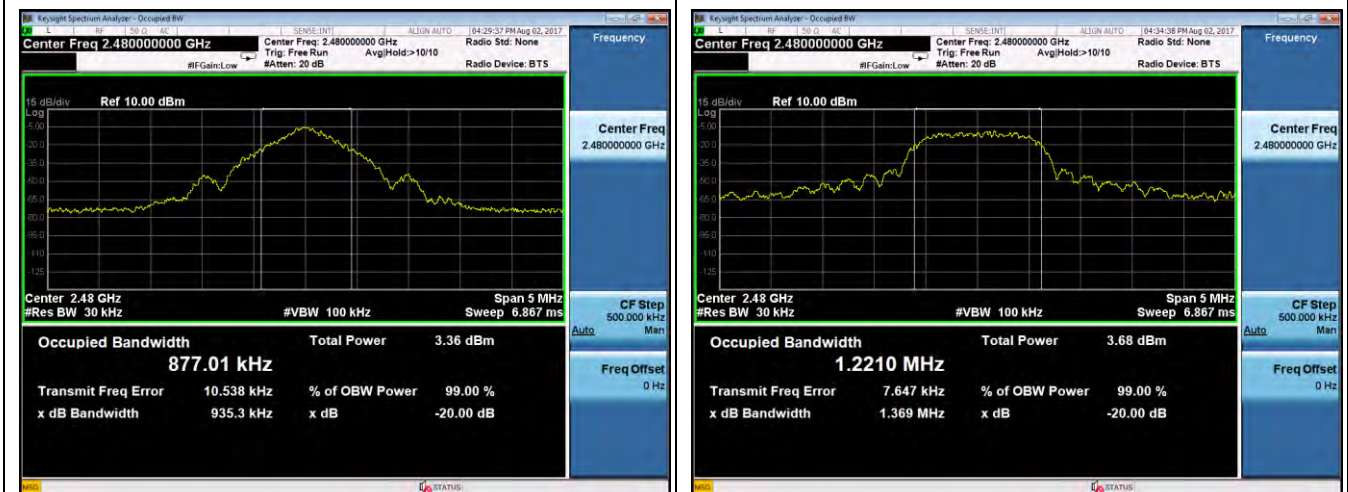
99% and 20dB BW –Bluetooth BDR 2402MHz

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	<u>Number of hopping frequencies procedure</u> 1. The EUT must have its hopping function enabled 2. Span = the frequency band of operation. 3. Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span. 4. Video (or Average) Bandwidth (VBW) $\geq$ 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	08/02/2017	Environmental condition
		Temperature 23oC Relative Humidity 47% Atmospheric Pressure 1019mbar
Remark	-	
Result	☒ Pass ☐ Fail	

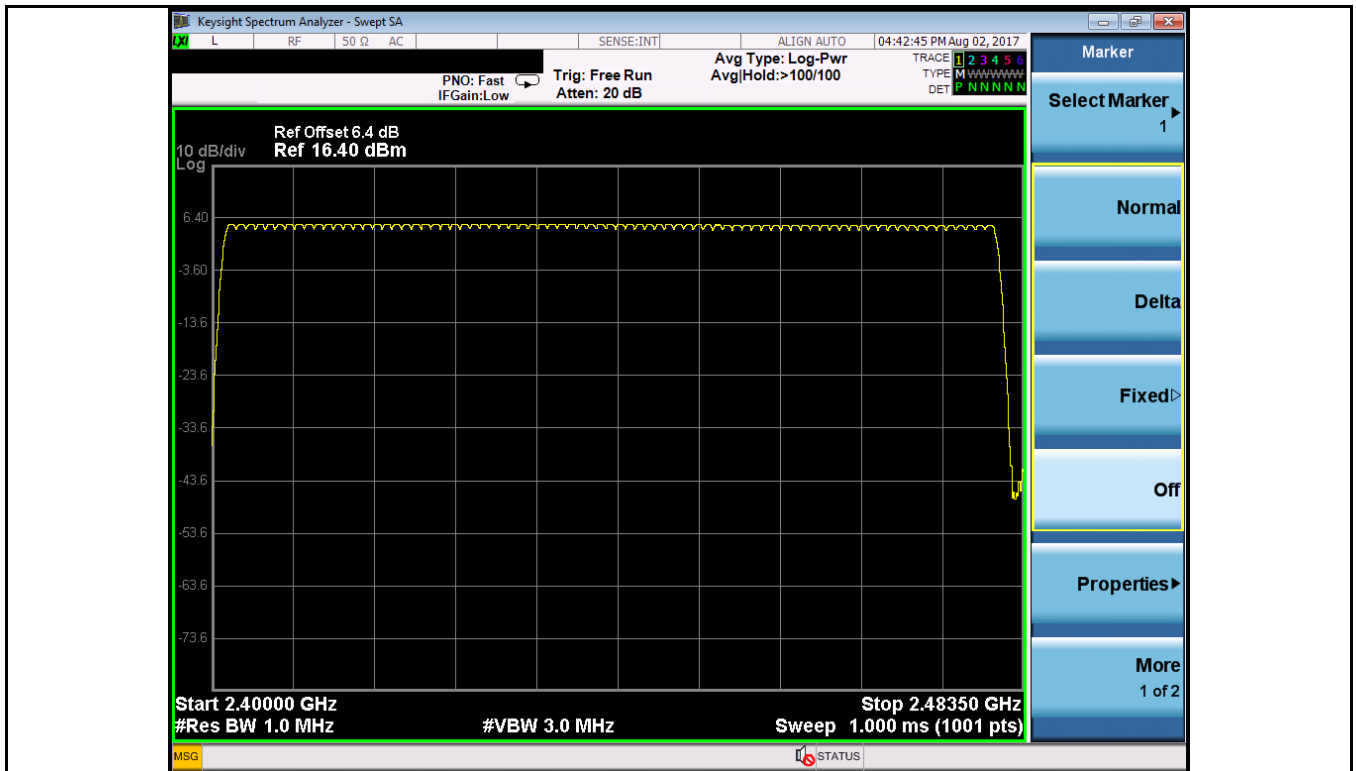
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

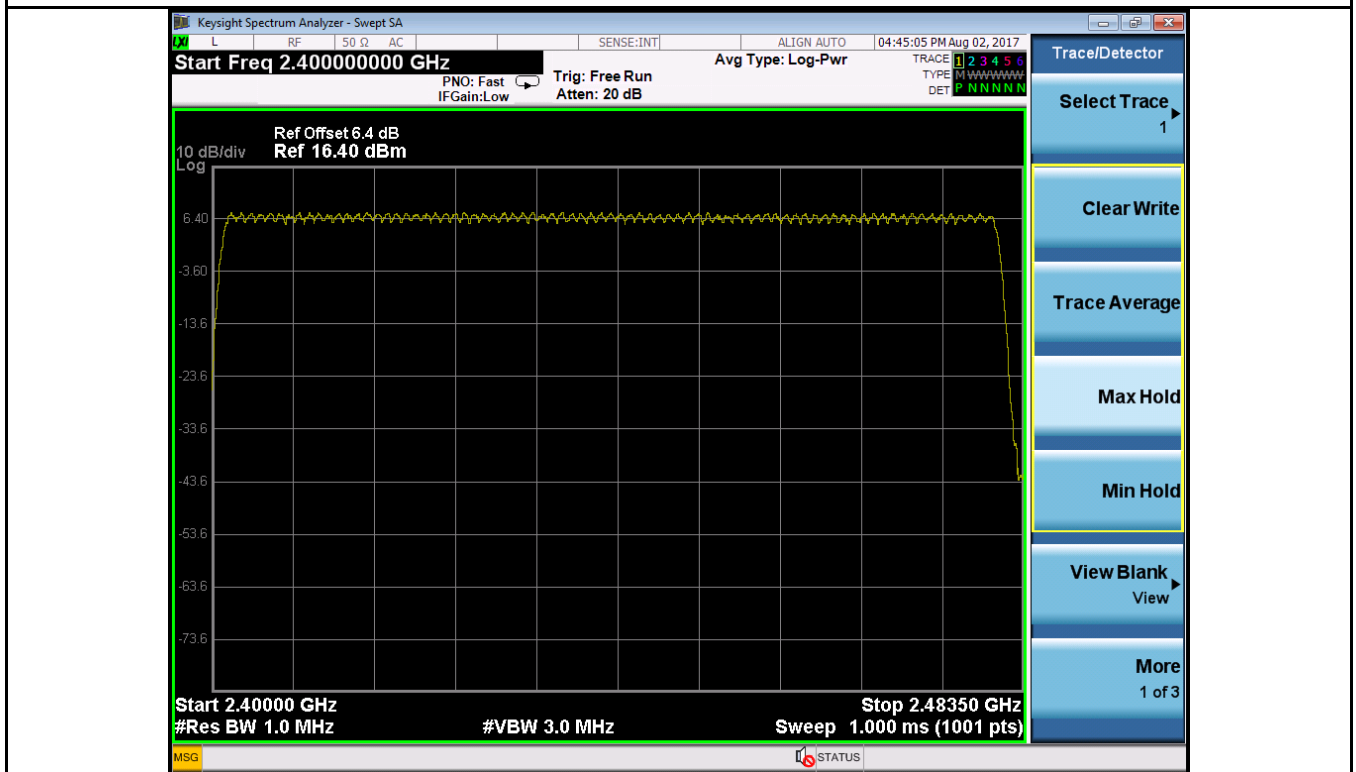
Test was done by *Rachana Khanduri* at *RF Test Site*.

Channel Number	Limit	Pass/Fail
79	>75	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 <u>Time of Occupancy Procedure</u> - 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	08/02/2017	Environmental condition Temperature 21°C Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	Dwell Time=Pulse time*(1600/6/79)*31.6s DH5 is the worst case.	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by *Rachana Khanduri* at *RF Test Site*.

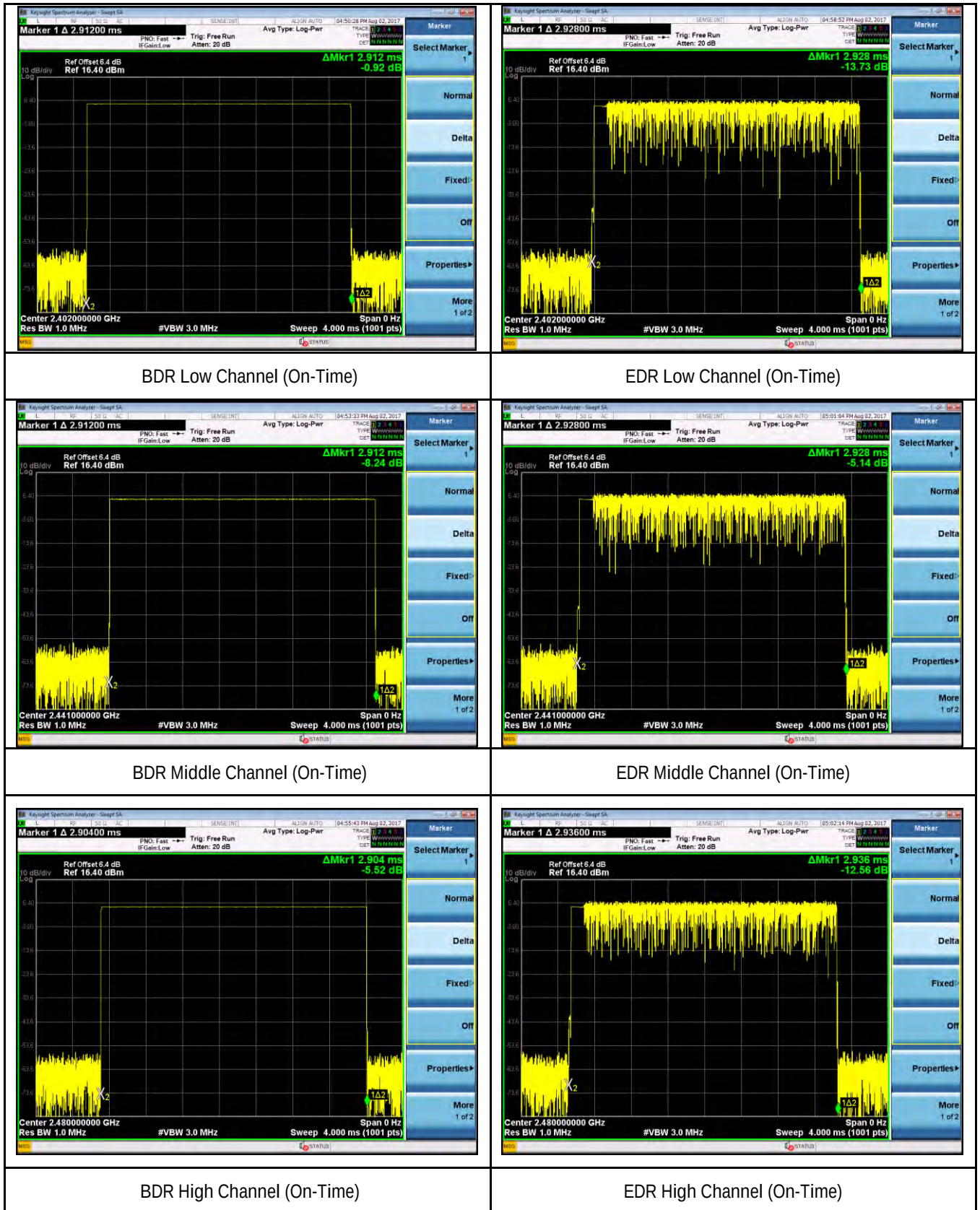
Bluetooth BDR Test Mode

Channel	Channel Frequency (MHz)	On Time (mSec)	Dwell Time (Sec)	Limit (Sec)
Low	2402	2.91	0.31	0.4
Mid	2441	2.91	0.31	0.4
High	2480	2.90	0.31	0.4

Bluetooth EDR Test Mode

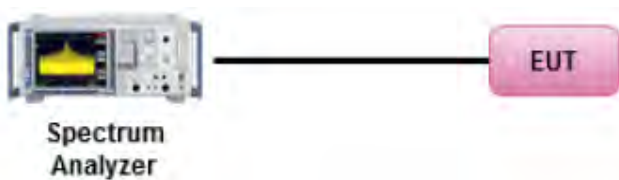
Channel	Channel Frequency (MHz)	On Time (mSec)	Dwell Time (Sec)	Limit (Sec)
Low	2402	2.93	0.31	0.4
Mid	2441	2.93	0.31	0.4
High	2480	2.94	0.31	0.4

Time of Occupancy Test Plot (Bluetooth BDR/EDR)



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	<u>Maximum output power measurement procedure</u> - 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	08/02/2017	Environmental condition	Temperature 21°C Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

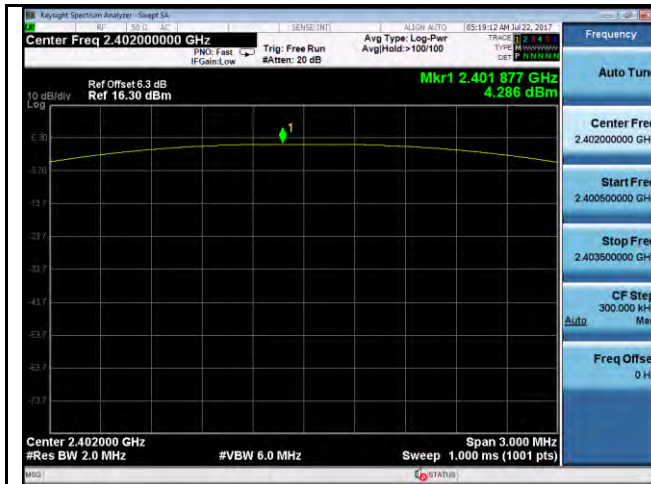
Test Plot ☒ Yes ☐ N/A

Test was done by *Rachana Khanduri* 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	4.27	≤30	Pass
	2441	Bluetooth BDR	Mid	4.22	≤30	Pass
	2480	Bluetooth BDR	High	4.18	≤30	Pass
	2402	Bluetooth EDR	Low	7.40	≤30	Pass
	2441	Bluetooth EDR	Mid	7.20	≤30	Pass
	2480	Bluetooth EDR	High	7.09	≤30	Pass

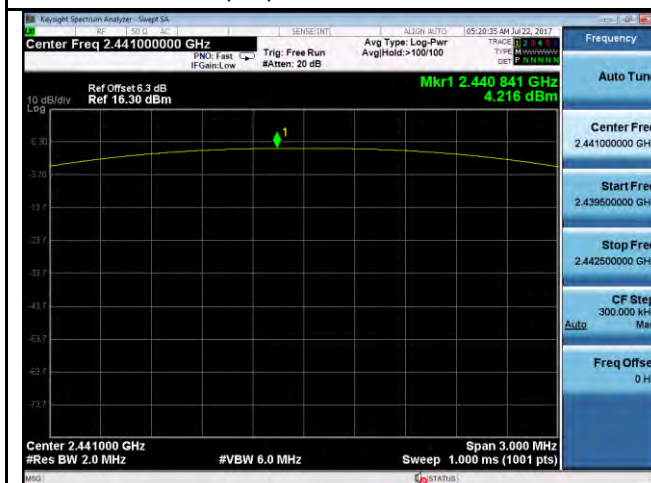
Peak Output Power Test Plot (Bluetooth BDR/EDR)



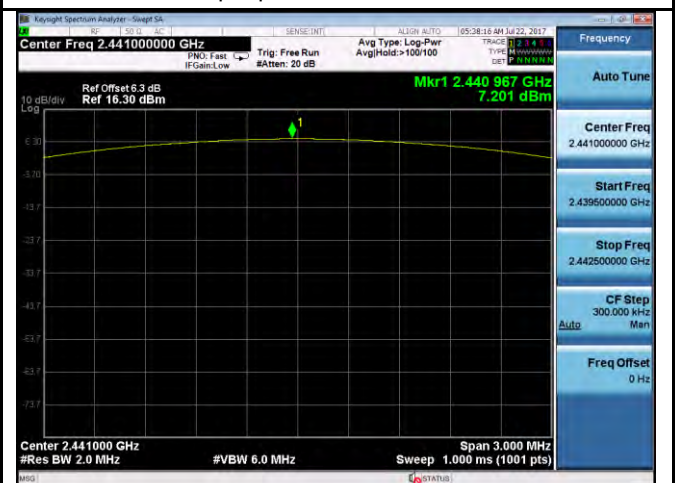
Output power - BDR 2402MHz



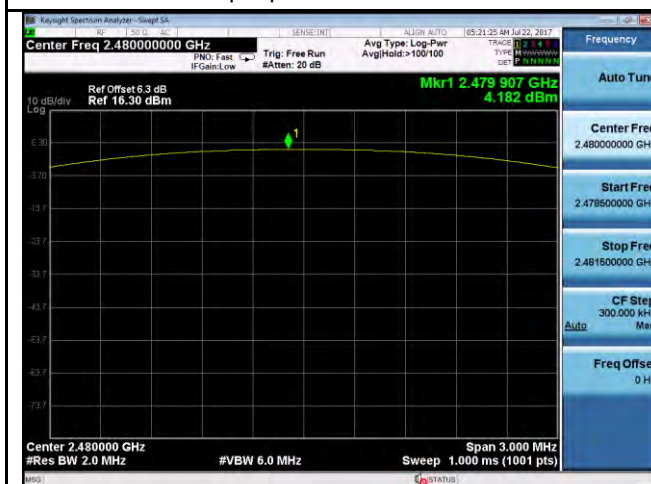
Output power - EDR 2402MHz



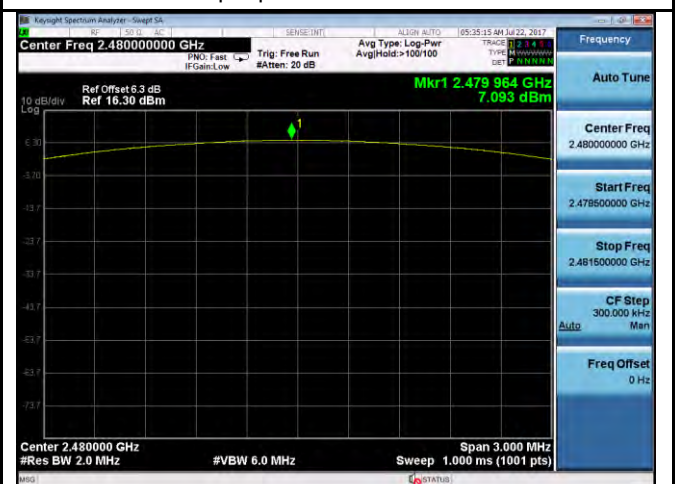
Output power - BDR 2441MHz



Output power - EDR 2441MHz



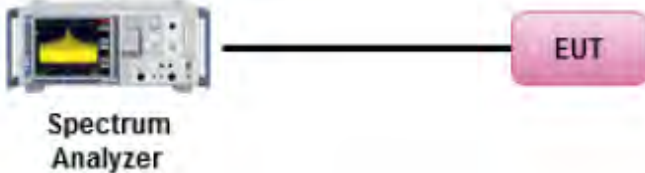
Output power - BDR 2480MHz



Output power - EDR 2480MHz

10.7 Band Edge (Bluetooth BDR/EDR)

Requirement(s):

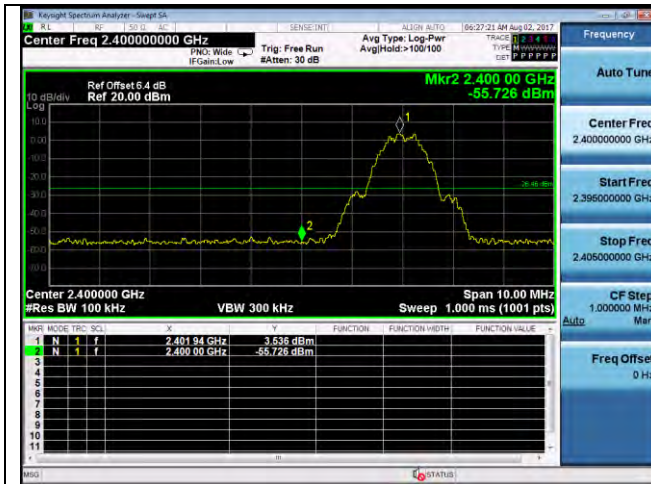
Spec	Item	Requirement	Applicable
§ 15.247	d)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 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	<u>Band Edge measurement procedure</u> - Set the EUT to maximum power setting and enable the EUT transmit continuously. - 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 Peak conducted output power procedure is used. - Change modulation and channel bandwidth then repeat step 1 to 2. - Measured and record the results in the test report.		
Test Date	08/02/2017	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes ☒ N/A

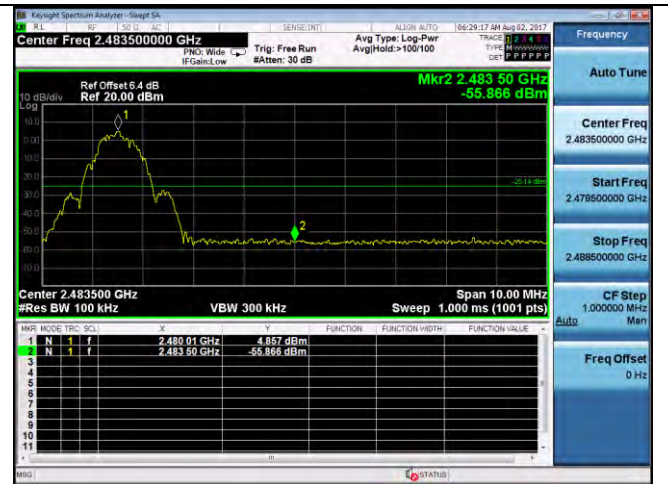
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by *Rachana Khanduri* at *RF Test Site*.

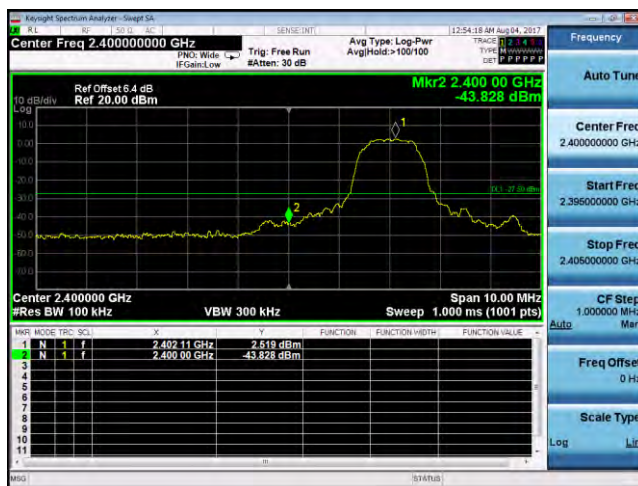
Band Edge Test Plots (Bluetooth)



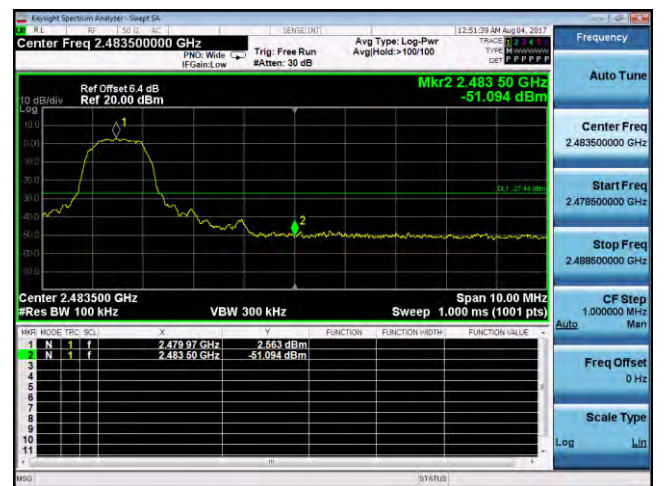
Band Edge -BDR 2402MHz



Band Edge -BDR 2480MHz

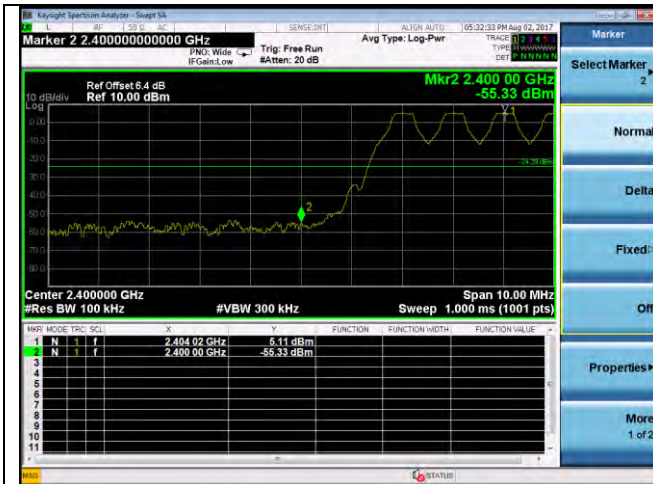


Band Edge -EDR 2402MHz



Band Edge -EDR 2480MHz

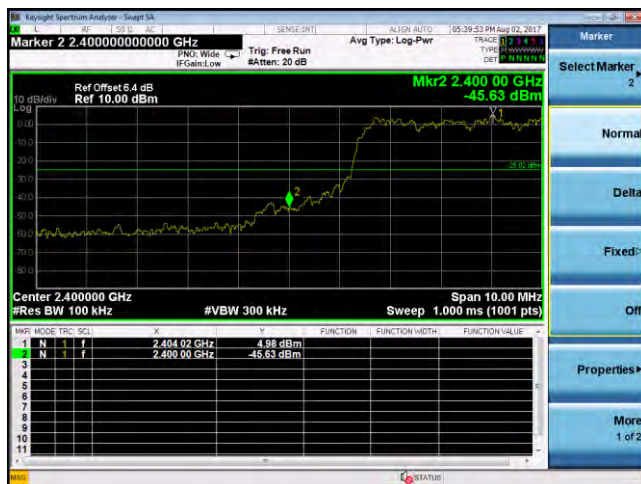
Band Edge Hopping Test Plots (Bluetooth)



Band Edge-Hopping-BDR 2402MHz



Band Edge-Hopping-BDR 2480MHz



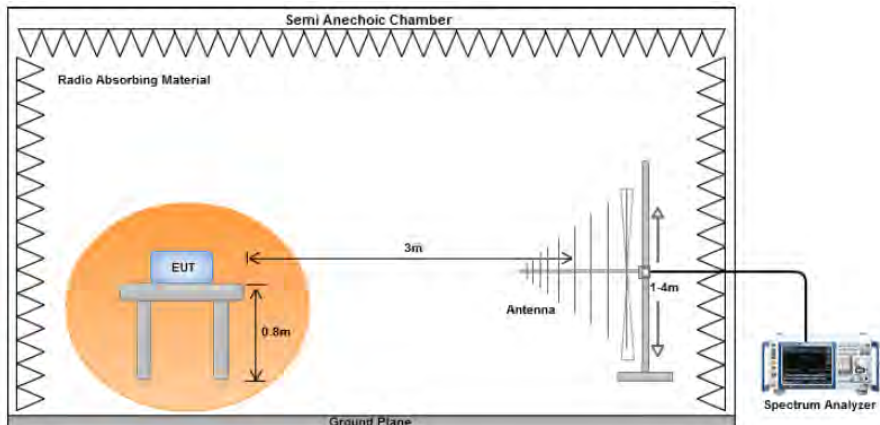
Band Edge-Hopping-EDR 2402MHz



Band Edge-Hopping-EDR 2480MHz

10.8 Transmitter Radiated Spurious Emissions Below 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable							
47CFR§15.247(d), RSS247(5.5)	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. 2. 3. 4. 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: a. b. c. 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.									
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									

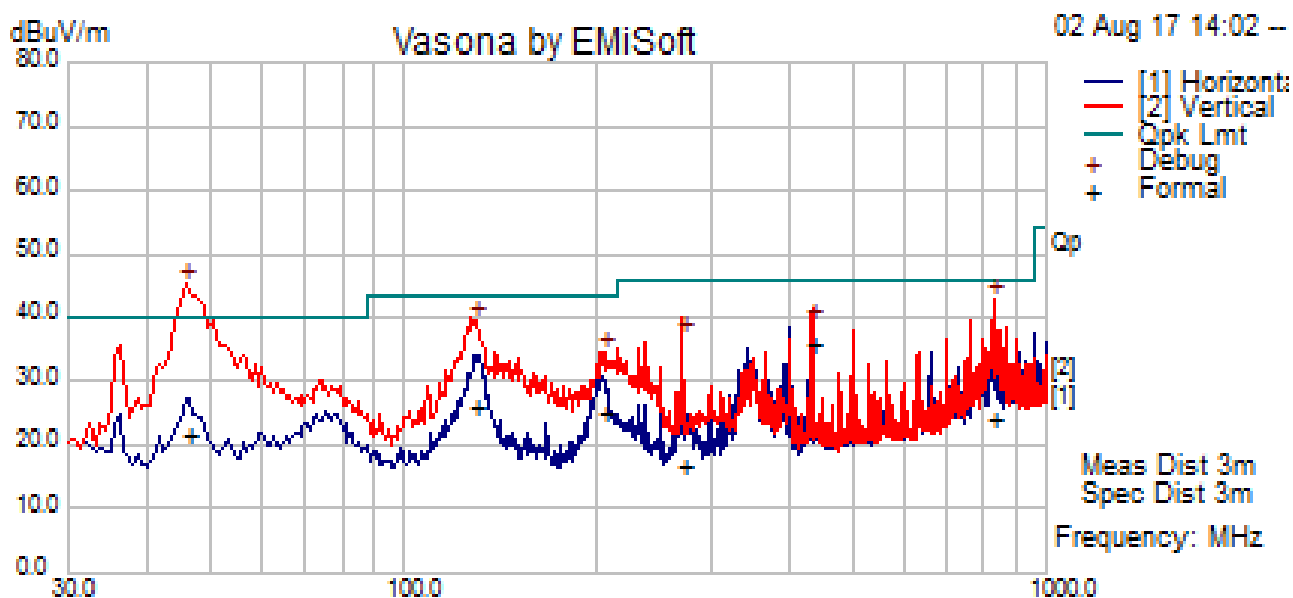
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by *Rachana Khanduri* at *10m Chamber*.

Radiated Emission Test Results (Below 1GHz)

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:	Rachana Khanduri			
Test Date:	08/02/2017			
Remarks:	BDR 2441MHz			

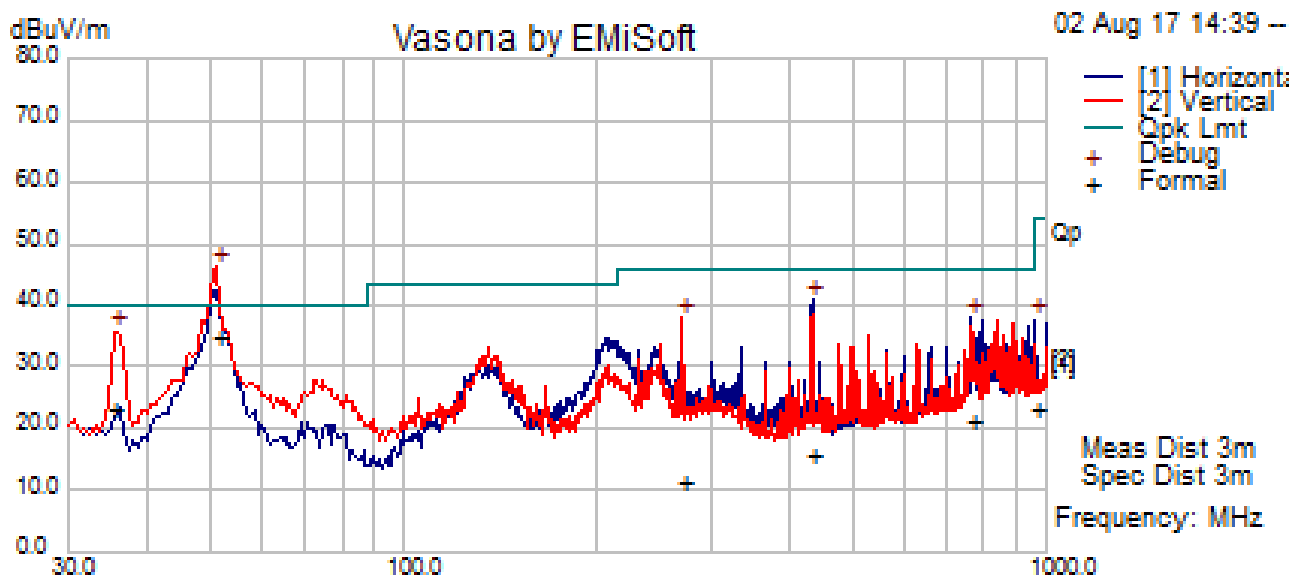


Quasi Max Measurement

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
45.976	35.42	11.54	-25.60	21.36	Quasi Max	H	171	262	40	-18.64	Pass
831.47	22.17	16.29	-14.42	24.04	Quasi Max	H	129	152	46	-21.96	Pass
128.769	36.39	12.29	-22.87	25.80	Quasi Max	H	179	231	43.5	-17.70	Pass
431.98	41.05	14.36	-19.71	35.71	Quasi Max	H	214	269	46	-10.29	Pass
205.00	36.44	12.88	-24.16	25.16	Quasi Max	H	105	240	43.5	-18.34	Pass
271.23	26.97	13.32	-23.60	16.70	Quasi Max	H	147	208	46	-29.30	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

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:	Rachana Khanduri			
Test Date:	08/02/2017			
Remarks:	EDR 2441MHz			

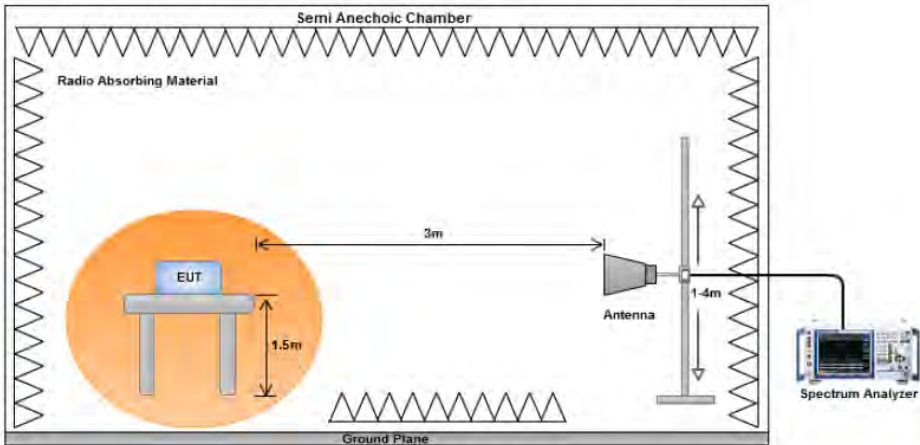


Quasi Max Measurement

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
51.13	50.43	11.59	-27.25	34.77	Quasi Max	V	226	165	40	-5.23	Pass
35.21	29.80	11.37	-18.14	23.04	Quasi Max	V	177	201	40	-16.96	Pass
433.34	20.95	14.36	-19.69	15.62	Quasi Max	H	175	181	46	-30.38	Pass
766.62	19.96	16.02	-15.04	20.94	Quasi Max	H	106	243	46	-25.06	Pass
271.42	21.64	13.33	-23.59	11.37	Quasi Max	V	360	142	46	-34.63	Pass
959.89	19.53	16.93	-13.31	23.15	Quasi Max	H	376	76	46	-22.86	Pass

10.9 Transmitter Radiated Spurious Emissions > 1GHz & Restricted band & non-restricted band emission

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	- 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 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 *Rachana Khanduri* at *3m 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
4804	45.28	5.47	-2.03	48.73	Peak Max	H	138	107	74	-25.28	Pass
1995	42.63	3.55	-6.06	40.11	Peak Max	V	284	356	74	-33.89	Pass
1328	51.7	3.01	-9.22	45.49	Peak Max	V	159	146	74	-28.51	Pass
*13042	37.85	9.60	3.63	51.08	Peak Max	V	131	4	74	-22.92	Pass
4804	37.33	5.47	-2.03	40.77	Average Max	H	138	107	54	-13.23	Pass
1995	30.53	3.55	-6.06	28.01	Average Max	V	284	356	54	-25.99	Pass
1328	32.21	3.01	-9.22	26	Average Max	V	159	146	54	-28	Pass
*13042	26.48	9.60	3.63	39.70	Average Max	V	131	4	54	-14.30	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
4882	43.36	5.51	-2.15	46.72	Peak Max	H	134	115	74	-27.28	Pass
1869	43.52	3.45	-6.69	40.28	Peak Max	V	356	231	74	-33.72	Pass
1330	47.77	3.01	-9.2	41.58	Peak Max	H	127	84	74	-32.42	Pass
*12166	39.79	9.27	2.46	51.51	Peak Max	V	229	66	74	-22.49	Pass
4882	33.95	5.51	-2.15	37.31	Average Max	H	134	115	54	-16.69	Pass
1869	30.67	3.45	-6.69	27.42	Average Max	V	356	231	54	-26.58	Pass
1330	31.97	3.01	-9.2	25.78	Average Max	H	127	84	54	-28.22	Pass
*12166	27.35	9.27	2.46	39.08	Average Max	V	229	66	54	-14.93	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
4960	44.15	5.56	-2.17	47.54	Peak Max	H	122	96	74	-26.46	Pass
1330	54.03	3.01	-9.2	47.84	Peak Max	H	206	102	74	-26.16	Pass
2266	43.51	3.78	-6.12	41.17	Peak Max	V	262	181	74	-32.83	Pass
*16174	37.88	10.65	3.96	52.48	Peak Max	V	325	48	74	-21.52	Pass
4960	36.63	5.56	-2.17	40.02	Average Max	H	122	96	54	-13.98	Pass
1330	32.73	3.01	-9.2	26.54	Average Max	H	206	102	54	-27.46	Pass
2266	31.13	3.78	-6.12	28.79	Average Max	V	262	181	54	-25.21	Pass
*16174	25.97	10.65	3.96	40.58	Average Max	V	325	48	54	-13.42	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
4804	40.93	5.47	-2.03	44.37	Peak Max	V	137	76	74	-29.63	Pass
1793	50.87	3.38	-7.2	47.05	Peak Max	V	127	67	74	-26.95	Pass
1328	53.27	3.01	-9.22	47.06	Peak Max	V	163	143	74	-26.94	Pass
*16506	37.50	10.82	5.92	54.24	Peak Max	V	131	14	74	-19.76	Pass
4804	28.87	5.47	-2.03	32.31	Average Max	V	137	76	54	-21.69	Pass
1793	30.25	3.38	-7.2	26.43	Average Max	V	127	67	54	-27.57	Pass
1328	33.87	3.01	-9.22	27.66	Average Max	V	163	143	54	-26.34	Pass
*16506	25.73	10.82	5.92	42.47	Average Max	V	131	14	54	-11.53	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
4882	46.66	5.51	-2.15	50.02	Peak Max	H	205	255	74	-23.98	Pass
1330	55.62	3.01	-9.2	49.43	Peak Max	H	392	62	74	-24.57	Pass
2011	41.58	3.56	-6.02	39.11	Peak Max	H	257	324	74	-34.89	Pass
*14746	38.30	10.09	4.26	52.65	Peak Max	V	226	316	74	-21.35	Pass
4882	37.95	5.51	-2.15	41.31	Average Max	H	205	255	54	-12.69	Pass
1330	30.81	3.01	-9.2	24.62	Average Max	H	392	62	54	-29.38	Pass
2011	29.97	3.56	-6.02	27.51	Average Max	H	257	324	54	-26.49	Pass
*14746	25.84	10.09	4.26	40.19	Average Max	V	226	316	54	-13.81	Pass

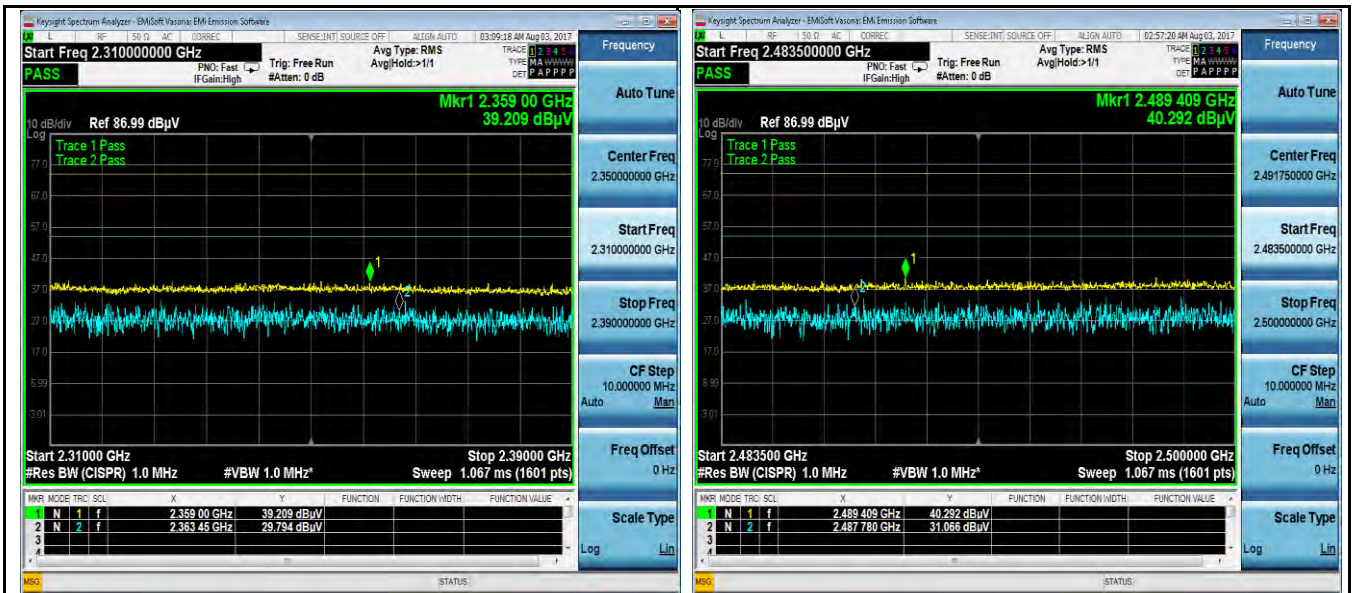
Bluetooth EDR – 2480MHz

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
4960	50.57	5.56	-2.17	53.96	Peak Max	H	105	89	74	-20.04	Pass
1329	53.35	3.01	-9.21	47.15	Peak Max	V	108	323	74	-26.85	Pass
1107	43.45	2.86	-11.23	35.09	Peak Max	V	336	261	74	-38.92	Pass
*14938	37.89	10.04	4.08	52.01	Peak Max	V	196	226	74	-21.99	Pass
4960	43.83	5.56	-2.17	47.21	Average Max	H	105	89	54	-6.79	Pass
1329	31.39	3.01	-9.21	25.19	Average Max	V	108	323	54	-28.81	Pass
1107	31.16	2.86	-11.23	22.8	Average Max	V	336	261	54	-31.2	Pass
*14938	25.86	10.04	4.08	39.98	Average Max	V	196	226	54	-14.02	Pass

*EUT in horizontal orientation

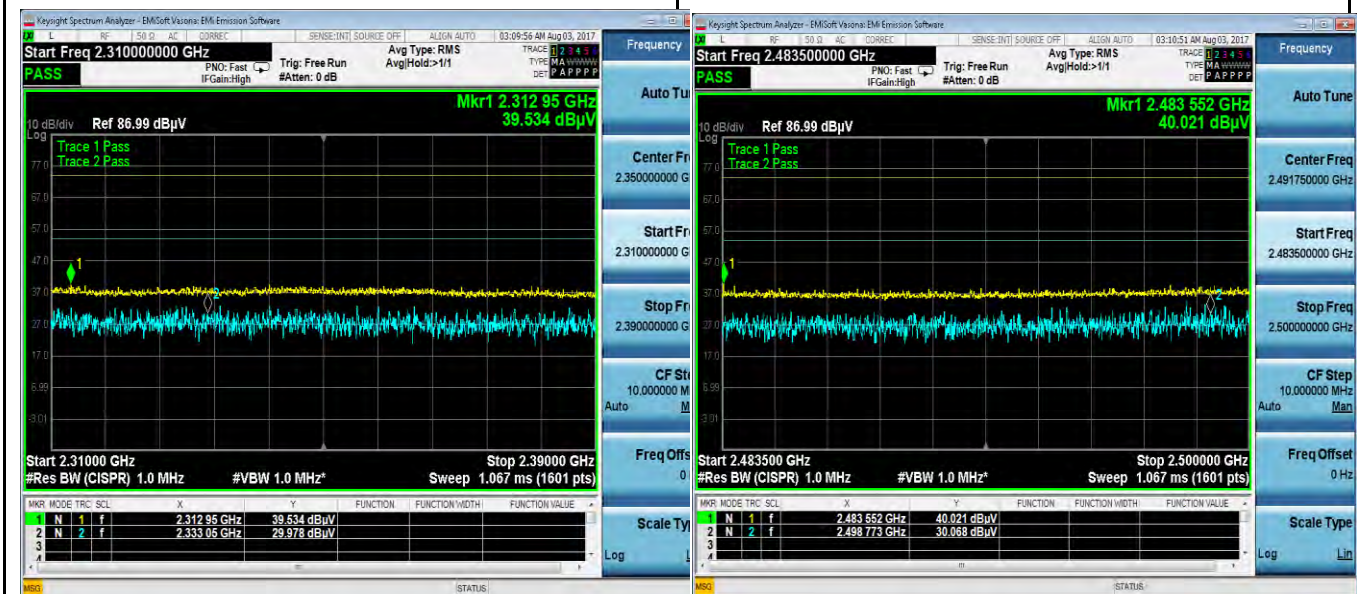
Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

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	04/21/2017	1 Year	04/21/2018	☒
CHASE LISN	MN2050B	1018	08/16/2016	1 Year	08/16/2017	☒
Radiated Emissions						
Keysight EXA 44GHz Spectrum Analyzer	N9010A	MY51440112	11/02/2016	1 Year	11/02/2017	☒
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	01/13/2017	1 Year	01/13/2018	☒
Horn Antenna (1GHz~26GHz)	3115	100059	08/11/2016	1 Year	08/11/2017	☒
Pre-Amplifier (1-40GHz)	SAS-474	579	05/04/2017	1 Year	05/04/2018	☒
Preamplifier (100KHz-7GHz)	LPA-6-30	11140711	02/09/2017	1 Year	02/09/2018	☒
3 Meters SAC	3M	N/A	09/09/2016	1 Year	09/09/2017	☐
10 Meters SAC	10M	N/A	10/06/2016	1 Year	10/06/2017	☒
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	11/16/2016	1 Year	11/16/2017	☒

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