

RF TEST REPORT



Report No.: FCC_IC_RF_SL18011503-ZBR-001-DTS

Supersede Report No.:

Applicant	:	Zebra Technologies Corporation
Host Product Name	:	Mobile Thermal Printer
Host Model No.	:	ZQ510 and ZQ520
Module Model No.	:	WYSBHVXGXG
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	:	I28MD-FXLAN11AC
IC ID	:	3798B-FXLAN11AC
Dates of test	:	01/29/2018 – 02/02/2018
Issue Date	:	02/08/2018
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:	
	
Rachana Khanduri	Chen Ge

Issued By:
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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 & Radio Equipment Directive (RED)
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_SL18011503-ZBR-001-DTS	None	Original	02/08/2018

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.: ZQ510 and ZQ520
Module Model No. WYSBHVXGXG

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.	ZQ510 and ZQ520
Module Model No.	WYSBHVXG
Trade Name	Zebra
Serial No.	XXRBJ172300814
Input Power	100-240VAC,50/60Hz
Power Adapter Manu/Model	FSP025-DYAA3
Power Adapter SN	N/A
Product Hardware version	N/A
Product Software version	7620
Radio Hardware version	N/A
Radio Software version	15.68.07.p62
Date of EUT received	01/25/2018
Equipment Class/ Category	DTS, UNII
Port/Connectors	USB
Remark	NONE

6.2 Radio Description

Radio Type	802.11b	802.11g	802.11n-20M	802.11n-40M
Operating Frequency	2412-2462MHz	2412-2462MHz	2412-2462MHz	2422-2452MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	5MHz	5MHz
Number of Channels	11	11	11	7
Antenna Type	Patch Antenna			
Antenna Gain (Peak)	2.4GHz: 3.66 dBi			
Antenna Connector Type	U.FL connector			
Note	2.4GHz and 5GHz Radio does not transmit simultaneously			

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 558074 D01 DTS Meas Guidance v04	☒ Pass
	IC	RSS Gen 8.10	IC		☐ N/A
AC Conducted Emissions	FCC	15.207(a)	FCC	ANSI C63.10:2013	☒ Pass *
	IC	RSS Gen 8.8	IC	RSS Gen Issue 4: 2014	☐ N/A

DTS Band Requirement

Test Item	Test standard		Test Method/Procedure		Pass / Fail
99% Occupied Bandwidth	-	-	-	-	☒ Pass*
	IC	RSS Gen 6.6	IC	RSS Gen Issue 4: 2014 -	☐ N/A
6dB Bandwidth	FCC	15.247(a)(2)	FCC	558074 D01 DTS Meas Guidance v04	☒ Pass*
	IC	RSS247 (5.2.1)	IC		☐ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	ANSI C63.10:2013 558074 D01 DTS Meas Guidance v04	☒ Pass
	IC	RSS247 (5.5)	IC		☐ N/A
Output Power	FCC	15.247(b)	FCC	558074 D01 DTS Meas Guidance v04	☒ Pass*
	IC	RSS247 (5.4.4)	IC		☐ N/A
Receiver Spurious Emissions	IC	RSS Gen (4.8)	IC	RSS Gen Issue 4: 2014	☐ Pass ☒ N/A
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	-	☐ Pass
	IC	-	IC	-	☒ N/A
Power Spectral Density	FCC	15.247(e)	FCC	558074 D01 DTS Meas Guidance v04	☒ Pass*
	IC	RSS247 (5.2.2)	IC		☐ N/A
RF Exposure requirement	FCC	15.247(i)	FCC	-	☐ Pass
	IC	RSS Gen(5.5)	IC	RSS Gen Issue 4: 2014	☒ N/A
Remark	- All measurement uncertainties do not take into consideration for all presented test results. - 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. - Pass* : Please refer to FCC ID: 128MD-FXLAN11AC test report.				

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

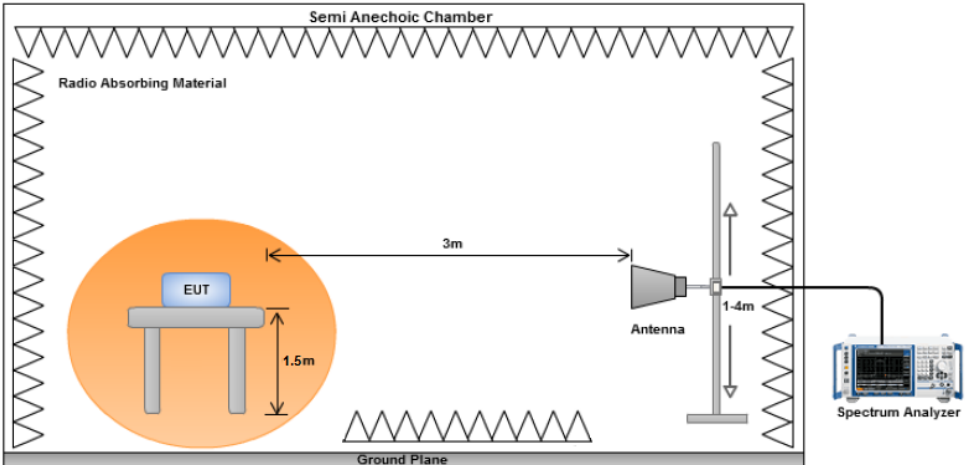
Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					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 Radiated Spurious Emissions in restricted band

Requirement(s):

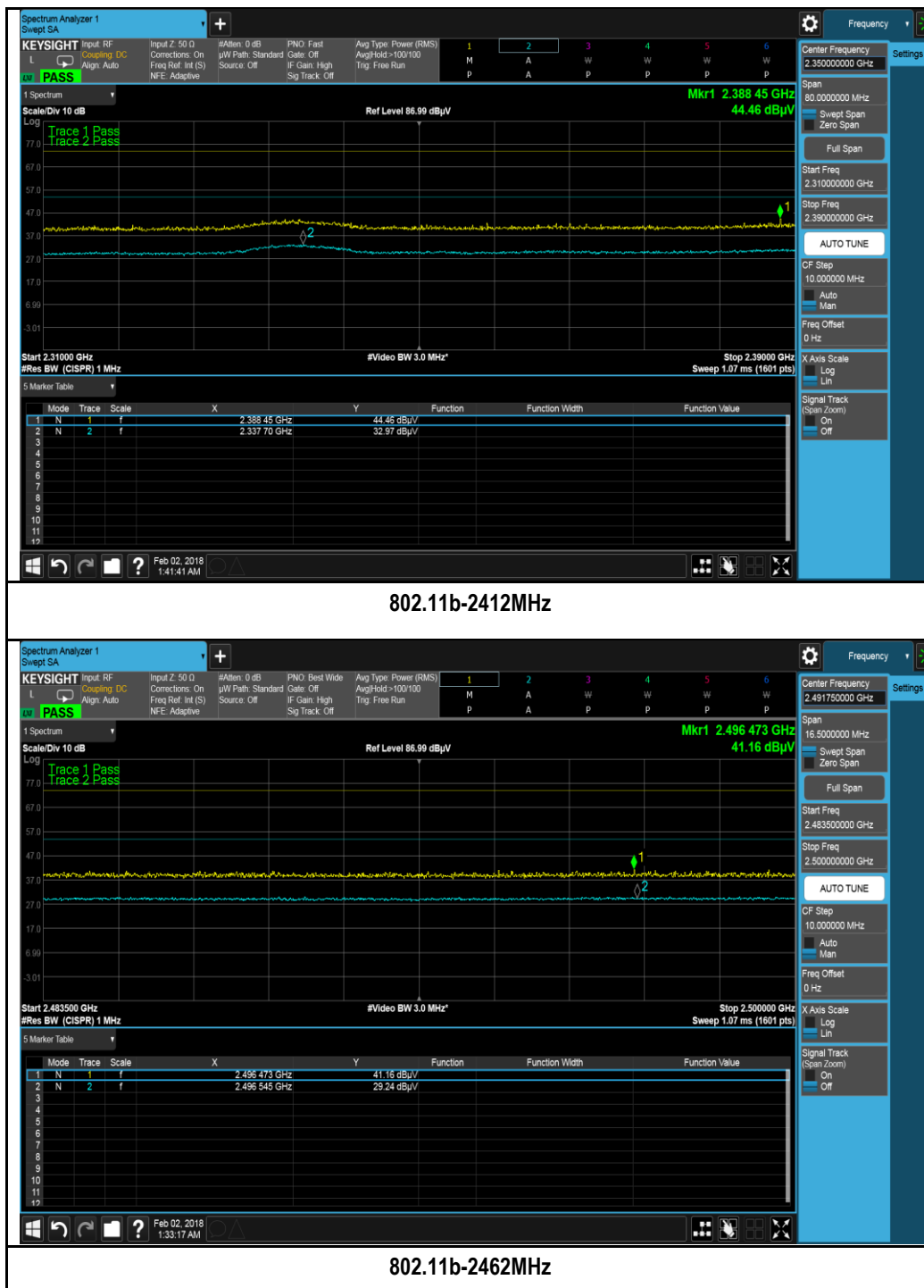
Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS247(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☐ 20 dB down ☒ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass ☐ Fail		

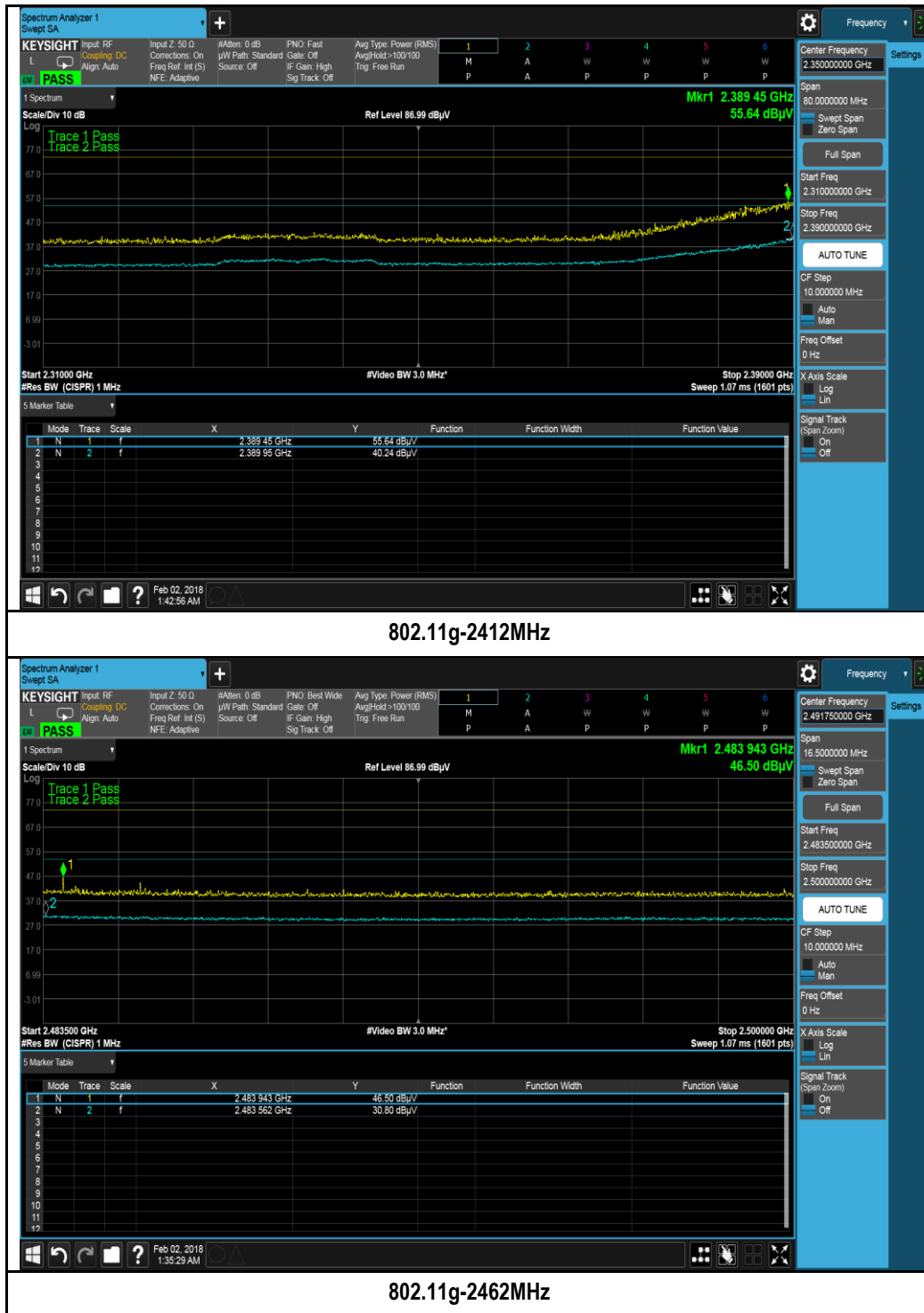
Test Data ☐ Yes (See below) ☒ N/A

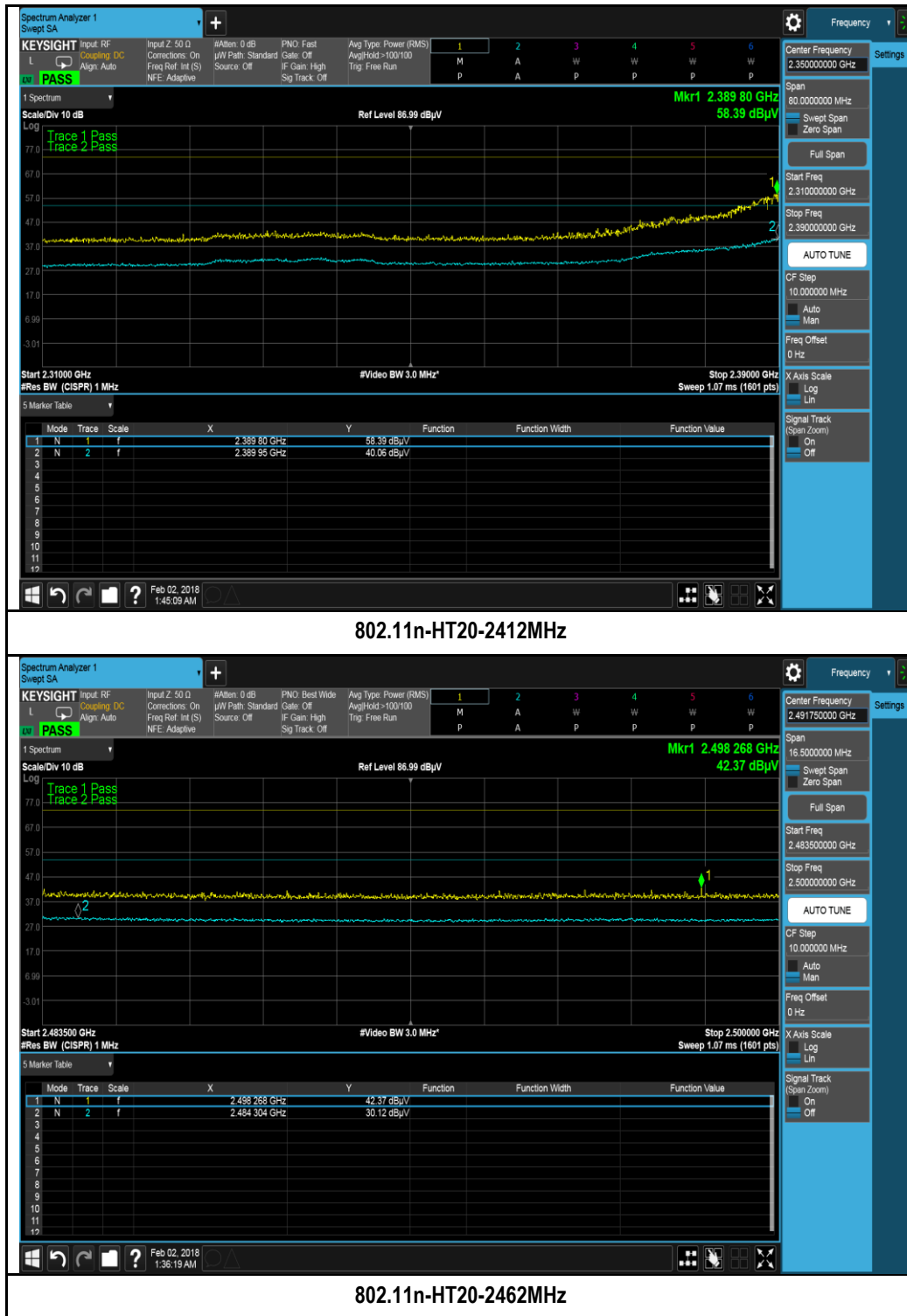
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Rachana Khanduri at 10m chamber.

Restricted Band Measurement Plots:



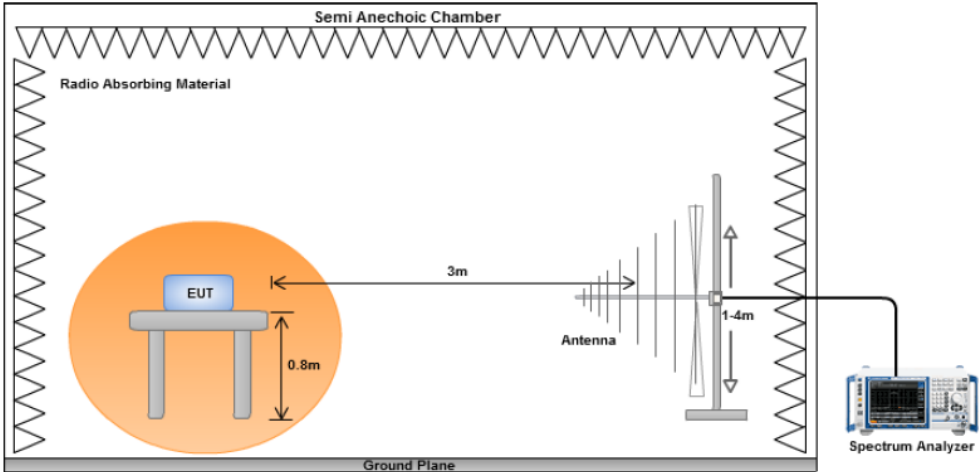






10.2 Radiated Spurious Emissions below 1GHz

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									

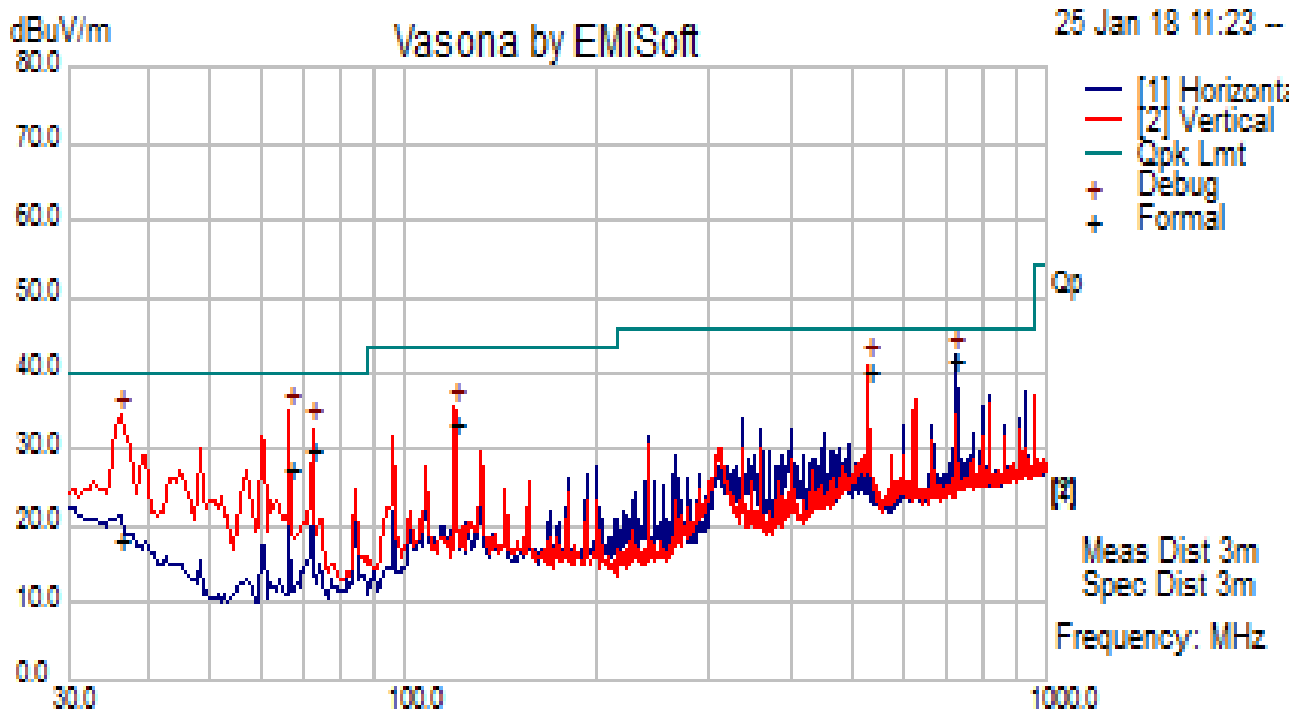
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Rachana Khanduri at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	Below 1GHz			
Environmental Conditions:	Temp (°C):	23	Result	Pass
	Humidity (%)	46		
	Atmospheric (mbar):	1018		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	01/25/2018			
Remarks:	802.11n HT40, Middle Channel			



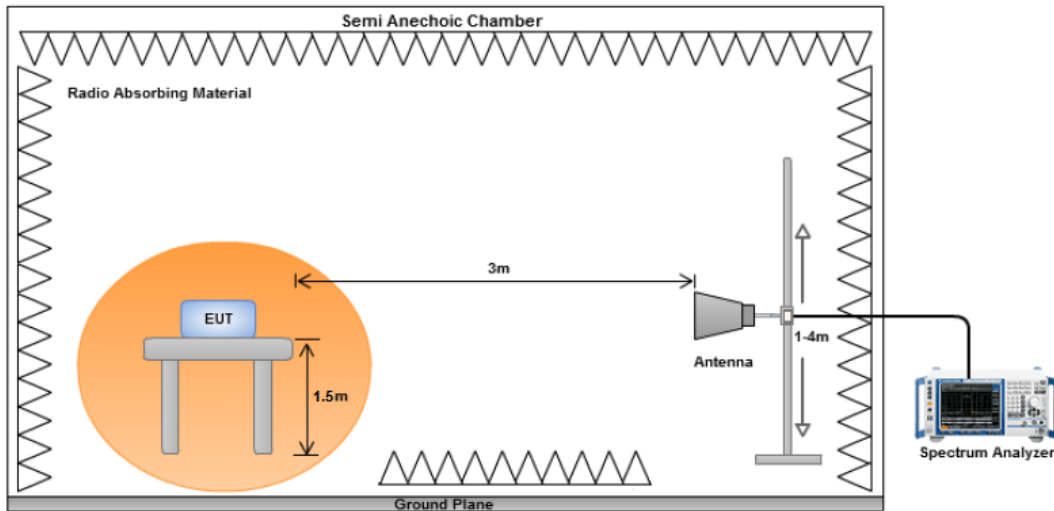
Quasi Max Measurements

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
36.23	24.98	11.39	-18.37	18.00	Quasi Max	V	114.00	254.00	40.00	-22.00	Pass
66.49	43.52	11.69	-27.62	27.59	Quasi Max	V	106.00	38.00	40.00	-12.42	Pass
72.01	46.05	11.72	-27.69	30.09	Quasi Max	V	103.00	293.00	40.00	-9.91	Pass
120.01	43.88	12.25	-22.87	33.26	Quasi Max	V	99.00	117.00	43.50	-10.24	Pass
528.01	43.28	14.81	-18.08	40.00	Quasi Max	V	100.00	295.00	46.00	-6.00	Pass
720.06	41.10	15.82	-15.26	41.67	Quasi Max	H	110.00	356.00	46.00	-4.33	Pass

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

10.3 Radiated Spurious Emissions between 1GHz – 25GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS247(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☐ 20 dB down ☒ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass ☐ Fail		

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 (Above 1GHz)

Above 1GHz-25GHz – 802.11b – 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4824.09	45.51	4.12	-0.81	48.83	Peak Max	H	132.00	289.00	74.00	-25.17	Pass
7235.79	38.97	5.16	-0.33	43.80	Peak Max	V	270.00	104.00	74.00	-30.20	Pass
13905.57	38.06	7.23	4.73	50.01	Peak Max	H	240.00	183.00	74.00	-23.99	Pass
4824.09	31.25	4.12	-0.81	34.57	Average Max	H	132.00	289.00	54.00	-19.44	Pass
7235.79	26.66	5.16	-0.33	31.49	Average Max	V	270.00	104.00	54.00	-22.51	Pass
13905.57	26.02	7.23	4.73	37.97	Average Max	H	240.00	183.00	54.00	-16.03	Pass

Above 1GHz-25GHz- 802.11b - 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4873.97	48.20	4.17	-0.88	51.49	Peak Max	V	196.00	329.00	74.00	-22.51	Pass
7311.32	38.61	5.15	-0.35	43.41	Peak Max	V	223.00	245.00	74.00	-30.59	Pass
12269.39	38.72	6.51	4.20	49.43	Peak Max	H	169.00	219.00	74.00	-24.57	Pass
4873.97	33.82	4.17	-0.88	37.12	Average Max	V	196.00	329.00	54.00	-16.89	Pass
7311.32	26.59	5.15	-0.35	31.39	Average Max	V	223.00	245.00	54.00	-22.61	Pass
12269.39	26.50	6.51	4.20	37.22	Average Max	H	169.00	219.00	54.00	-16.79	Pass

Above 1GHz-25GHz – 802.11b – 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4923.75	48.72	4.22	-0.95	51.98	Peak Max	V	168.00	339.00	74.00	-22.02	Pass
7386.50	38.88	5.14	-0.37	43.65	Peak Max	V	205.00	59.00	74.00	-30.35	Pass
12448.51	38.25	6.54	4.63	49.42	Peak Max	V	298.00	161.00	74.00	-24.58	Pass
4923.75	35.73	4.22	-0.95	39.00	Average Max	V	168.00	339.00	54.00	-15.01	Pass
7386.50	26.66	5.14	-0.37	31.43	Average Max	V	205.00	59.00	54.00	-22.57	Pass
12448.51	26.43	6.54	4.63	37.59	Average Max	V	298.00	161.00	54.00	-16.41	Pass

Above 1GHz-25GHz- 802.11g - 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4824.00	41.82	4.12	-0.81	45.14	Peak Max	V	112.00	3.00	74.00	-28.86	Pass
7236.44	42.25	5.16	-0.33	47.08	Peak Max	V	119.00	306.00	74.00	-26.93	Pass
12284.09	39.17	6.52	4.23	49.91	Peak Max	V	234.00	60.00	74.00	-24.09	Pass
4824.00	29.26	4.12	-0.81	32.58	Average Max	V	112.00	3.00	54.00	-21.42	Pass
7236.44	28.16	5.16	-0.33	32.99	Average Max	V	119.00	306.00	54.00	-21.01	Pass
12284.09	26.56	6.52	4.23	37.31	Average Max	V	234.00	60.00	54.00	-16.69	Pass

Above 1GHz-25GHz – 802.11g – 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4874.45	41.53	4.17	-0.88	44.82	Peak Max	V	198.00	183.00	74.00	-29.18	Pass
7310.56	44.19	5.15	-0.35	48.99	Peak Max	V	133.00	43.00	74.00	-25.01	Pass
12544.97	38.26	6.56	4.72	49.55	Peak Max	H	203.00	32.00	74.00	-24.46	Pass
4874.45	28.78	4.17	-0.88	32.08	Average Max	V	198.00	183.00	54.00	-21.92	Pass
7310.56	28.44	5.15	-0.35	33.24	Average Max	V	133.00	43.00	54.00	-20.76	Pass
12544.97	26.11	6.56	4.72	37.39	Average Max	H	203.00	32.00	54.00	-16.61	Pass

Above 1GHz-25GHz- 802.11g - 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4924.44	45.91	4.22	-0.95	49.17	Peak Max	H	138.00	287.00	74.00	-24.83	Pass
7386.04	39.93	5.14	-0.37	44.70	Peak Max	V	280.00	4.00	74.00	-29.30	Pass
12234.62	38.57	6.50	4.14	49.21	Peak Max	H	102.00	145.00	74.00	-24.79	Pass
4924.44	33.74	4.22	-0.95	37.01	Average Max	H	138.00	287.00	54.00	-16.99	Pass
7386.04	27.36	5.14	-0.37	32.13	Average Max	V	280.00	4.00	54.00	-21.87	Pass
12234.62	26.57	6.50	4.14	37.21	Average Max	H	102.00	145.00	54.00	-16.79	Pass

Above 1GHz-25GHz- 802.11n20 - 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4824.70	41.04	4.12	-0.81	44.35	Peak Max	V	270.00	109.00	74.00	-29.65	Pass
7236.40	40.67	5.16	-0.33	45.49	Peak Max	V	130.00	49.00	74.00	-28.51	Pass
12532.73	38.54	6.56	4.72	49.82	Peak Max	V	120.00	329.00	74.00	-24.18	Pass
4824.70	27.32	4.12	-0.81	30.64	Average Max	V	270.00	109.00	54.00	-23.36	Pass
7236.40	27.03	5.16	-0.33	31.86	Average Max	V	130.00	49.00	54.00	-22.14	Pass
12532.73	26.29	6.56	4.72	37.57	Average Max	V	120.00	329.00	54.00	-16.43	Pass

Above 1GHz-25GHz – 802.11n20 – 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4874.44	43.42	4.17	-0.88	46.72	Peak Max	V	113.00	266.00	74.00	-27.28	Pass
7311.76	42.85	5.15	-0.35	47.65	Peak Max	V	138.00	44.00	74.00	-26.35	Pass
13692.08	37.92	7.10	4.60	49.63	Peak Max	V	268.00	13.00	74.00	-24.37	Pass
4874.44	31.25	4.17	-0.88	34.54	Average Max	V	113.00	266.00	54.00	-19.46	Pass
7311.76	28.02	5.15	-0.35	32.82	Average Max	V	138.00	44.00	54.00	-21.18	Pass
13692.08	25.86	7.10	4.60	37.56	Average Max	V	268.00	13.00	54.00	-16.44	Pass

Above 1GHz-25GHz- 802.11n20 - 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4924.02	42.09	4.12	-0.80	45.40	Peak Max	V	150.00	24.00	74.00	-28.60	Pass
7386.45	39.94	5.16	-0.33	44.77	Peak Max	V	116.00	127.00	74.00	-29.23	Pass
12549.51	37.97	6.57	4.72	49.26	Peak Max	V	285.00	265.00	74.00	-24.74	Pass
4924.02	29.05	4.12	-0.80	32.37	Average Max	V	150.00	24.00	54.00	-21.63	Pass
7386.45	26.64	5.16	-0.33	31.46	Average Max	V	116.00	127.00	54.00	-22.54	Pass
12549.51	26.13	6.57	4.72	37.41	Average Max	V	285.00	265.00	54.00	-16.59	Pass

Above 1GHz-25GHz- 802.11n40 - 2422MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4843.99	39.55	4.23	-0.96	42.83	Peak Max	V	274.00	100.00	74.00	-31.18	Pass
7265.78	38.79	5.37	-0.36	43.81	Peak Max	V	283.00	159.00	74.00	-30.19	Pass
12546.56	38.81	6.57	4.72	50.10	Peak Max	V	208.00	162.00	74.00	-23.90	Pass
4843.99	26.62	4.23	-0.96	29.89	Average Max	V	274.00	100.00	54.00	-24.11	Pass
7265.78	26.58	5.37	-0.36	31.59	Average Max	V	283.00	159.00	54.00	-22.41	Pass
12546.56	26.10	6.57	4.72	37.38	Average Max	V	208.00	162.00	54.00	-16.62	Pass

Above 1GHz-25GHz – 802.11n40 – 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4873.95	41.17	4.18	-0.91	44.45	Peak Max	V	113.00	337.00	74.00	-29.55	Pass
7311.62	38.94	5.15	-0.35	43.74	Peak Max	V	260.00	351.00	74.00	-30.26	Pass
13865.73	38.35	7.20	4.64	50.19	Peak Max	H	157.00	152.00	74.00	-23.81	Pass
4873.95	28.64	4.18	-0.91	31.92	Average Max	V	113.00	337.00	54.00	-22.08	Pass
7311.62	26.21	5.15	-0.35	31.01	Average Max	V	260.00	351.00	54.00	-22.99	Pass
13865.73	25.93	7.20	4.64	37.77	Average Max	H	157.00	152.00	54.00	-16.23	Pass

Above 1GHz-25GHz- 802.11n40 - 2452MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Height cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4904.41	39.89	3.52	-2.15	41.25	Peak Max	V	277.00	109.00	74.00	-32.75	Pass
7355.95	39.69	4.76	-0.02	44.43	Peak Max	V	300.00	83.00	74.00	-29.57	Pass
12464.90	38.32	6.54	4.66	49.52	Peak Max	V	227.00	166.00	74.00	-24.48	Pass
4904.41	27.45	3.52	-2.15	28.82	Average Max	V	277.00	109.00	54.00	-25.18	Pass
7355.95	26.50	4.76	-0.02	31.24	Average Max	V	300.00	83.00	54.00	-22.76	Pass
12464.90	26.40	6.54	4.66	37.60	Average Max	V	227.00	166.00	54.00	-16.40	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Radiated Emissions						
Keysight EXA 44GHz Spectrum Analyzer	N9030B(PXA)	MY57140374	09/06/2017	1 Year	09/06/2018	☒
Bi-Log antenna (30MHz~2GHz)	JB6	A030702	01/13/2017	1 Year	01/13/2018	☒
Horn Antenna (1GHz~26GHz)	3115	100059	11/09/2017	1 Year	11/09/2018	☒
Horn Antenna (18GHz~40GHz)	PA-840	181251	06/23/2017	1 Year	06/23/2018	☒
Preamplifier (100KHz~7GHz)	LPA-6-30	11170602	02/09/2017	1 Year	02/09/2018	☒
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	08/16/2017	1 Year	8/16/2018	☒

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 Equipment: EN45011: EN ISO/IEC 17065
		Electromagnetic Compatibility: EN45011 – EN ISO/IEC 17065
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 Measuremet
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 Radiocommunications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771 Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06, AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2