RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: RF_FCC_IC_SL19011103-SEV-111R2_DTS
Supersede Report No.:

Applicant	:	Trilliant Networks, Inc.
Product Name	:	SecureMesh Wan Connector
Model No.	:	CONN-2000
Test Standard	:	47 CFR 15.247 RSS 247 Iss 2: Feb 2017
Test Method	:	ANSI C63.10:2013 RSS Gen Iss 5: April 2018 558074 D01 15.247 Meas Guidance v05r01
FCC ID	:	TMB-CONN2000
IC	:	6028A-CONN2000
Dates of test	:	02/25/2019 - 03/22/2019
Issue Date	:	03/22/2019
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	
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 & 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
RF_FCC_IC_SL19011103-SEV-111R2_DTS	None	Original	03/22/2019

2 Executive Summary

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

Company: Trilliant Networks, Inc.
Product: SecureMesh WAN Connector
Model: CONN-2000

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page. This report is issued as a supplementary report to the original DTS report under FCC ID: 2AC7Z-ESPWROOM02, report no.: RXA1503-0042RF01R1 / IC: 21098-ESPWROOM02, report no.: RKS160204001-00A. Radiated Spurious Emission was retested for the module integration in host device CONN-2000. The module ESPWROOM02 remains unchanged from the original filing.

3 Customer information

FCC Applicant Name	Trilliant Networks
FCC Applicant Address	401 Harrison Oaks Blvd., Suite 300 Cary, NC 27513 USA
Manufacturer Name	Trilliant Networks
Manufacturer Address	401 Harrison Oaks Blvd., Suite 300 Cary, NC 27513 USA

IC Applicant Name	Trilliant Networks, Inc.
IC Applicant Address	610Rue Du Luxembourg Street, Granby QC J2J 2V2 Canada
Manufacturer Name	Trilliant Networks, Inc.
Manufacturer Address	610Rue Du Luxembourg Street, Granby QC J2J 2V2 Canada

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	540430
IC Test Site No.	4842D
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	SecureMesh Wan Connector
Model No.	CONN-2000
Trade Name	Trilliant
Serial No.	FC00000002
Input Power	48VDC (PoE)
Date of EUT received	02/06/2019
Equipment Class/ Category	DTS
Port/Connectors	PoE, Ethernet

6.2 Radio Description

Radio Type	802.11b	802.11g	802.11n-20M
Operating Frequency	2412-2462MHz	2412-2462MHz	2412-2462MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	5MHz
Number of Channels	11	11	11
Antenna Type	PCB Antenna		
Antenna Gain (Peak)	2 dBi		
Antenna Connector Type	N/A		
Note	N/A		

EUT Power level setting

Mode	Frequency (MHz)	Power setting
802.11-b	2412	Default
802.11-b	2437	Default
802.11-b	2462	Default
802.11-g	2412	Default
802.11-g	2437	Default
802.11-g	2462	Default
802.11-n-20	2412	Default
802.11-n-20	2437	Default
802.11-n-20	2462	Default

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	N17Q1	NXGNPAA0167300AA597600	Acer	N/A
2	POE Adapter	740-64214-001	N/A	Ruckus	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
1	EUT	RJ45	POE	RJ45	10	N/A	-
2	POE	RJ45	Laptop	RJ45	1	N/A	-

7.3 Test Software Description

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

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Antenna Requirement	FCC	15.203	ANSI C63.10 - 2013 558074 D01 15.247 Meas. Guidance v05	☒ Pass ☐ N/A
	IC	-		
AC Conducted Emissions Voltage	FCC	15.207	ANSI C63.10 - 2013 RSS Gen	☒ Pass* ☐ N/A
	IC	RSS Gen		

DTS Band Requirement

Test Item	Test standard		Test Method/Procedure		Pass / Fail
99% Occupied Bandwidth	-	-	-	-	☒ Pass* ☐ N/A
	IC	RSS Gen 6.6	IC	RSS Gen Issue 5: 2018	
6dB Bandwidth	FCC	15.247(a)(2)	FCC	558074 D01 15.247 Meas Guidance v05r01	☒ Pass* ☐ N/A
	IC	RSS247 (5.2.1)	IC		
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	ANSI C63.10:2013 558074 D01 15.247 Meas Guidance v05r01	☒ Pass ☐ N/A
	IC	RSS247 (5.5)	IC		
Output Power	FCC	15.247(b)	FCC	558074 D01 15.247 Meas Guidance v05r01	☒ Pass* ☐ N/A
	IC	RSS247 (5.4.4)	IC		
Receiver Spurious Emissions	IC	RSS Gen (4.8)	IC	RSS Gen Issue 5: 2018	☒ Pass ☐ N/A
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	-	☐ Pass ☒ N/A
	IC	-	IC	-	
Power Spectral Density	FCC	15.247(e)	FCC	558074 D01 15.247 Meas Guidance v05r01	☒ Pass* ☐ N/A
	IC	RSS247 (5.2.2)	IC		
RF Exposure requirement	FCC	15.247(i)	FCC	-	☒ Pass ☐ N/A
	IC	RSS Gen(5.5)	IC	RSS Gen Issue 5: 2018	

Remark	
	1. All measurement uncertainties do not take into consideration for all presented test results. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. 3. Pass*: Please refer to FCC and IC report FCC ID: 2AC7Z-ESPWROOM02, report no.: RXA1503-0042RF01R1 IC: 21098-ESPWROOM02, report no.: RKS160204001-00A

9 Measurement Uncertainty

9.1 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.

9.2 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.

9.3 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.

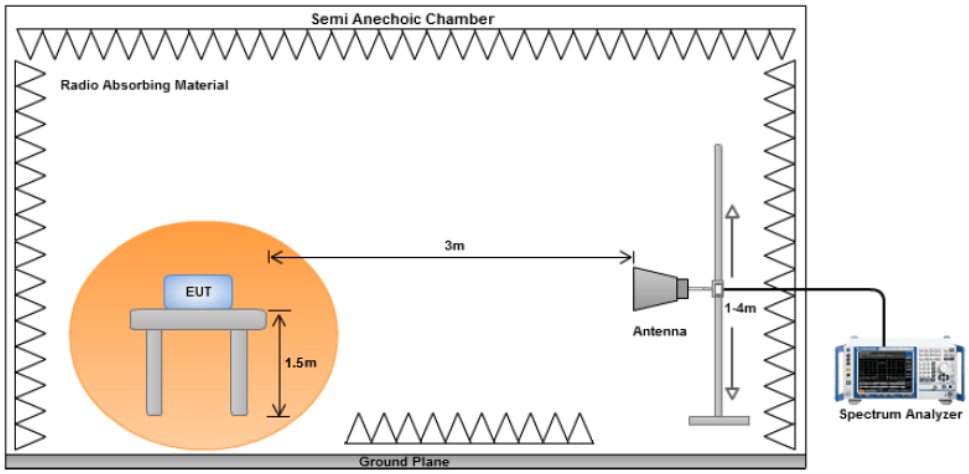
10 Measurements, Examination and Derived Results

10.1 Antenna Requirement

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

10.2 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		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 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.	
Result		☒ Pass ☐ Fail	

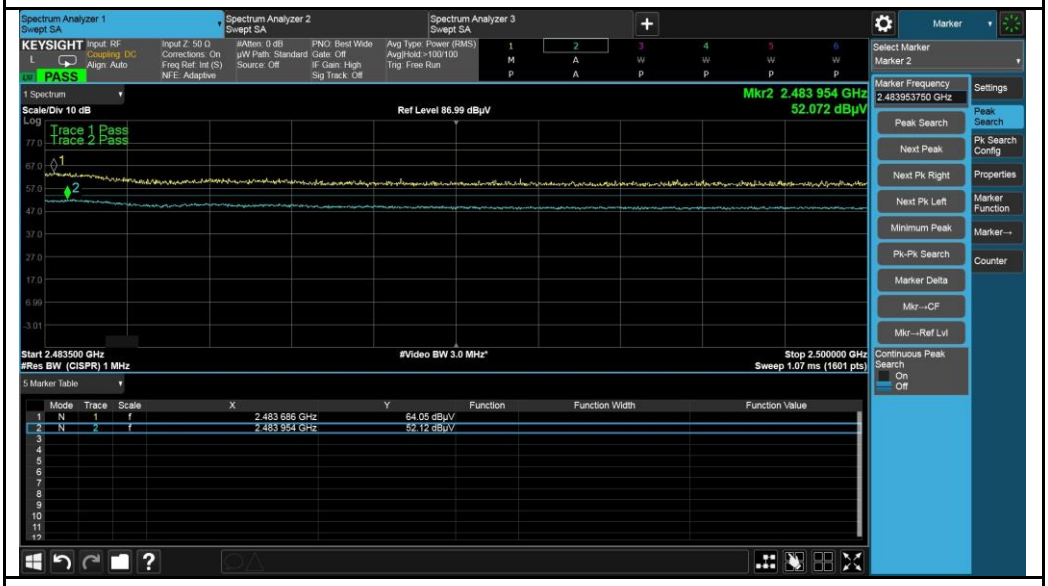
Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at 10m chamber.

Restricted Band Measurement Plots:

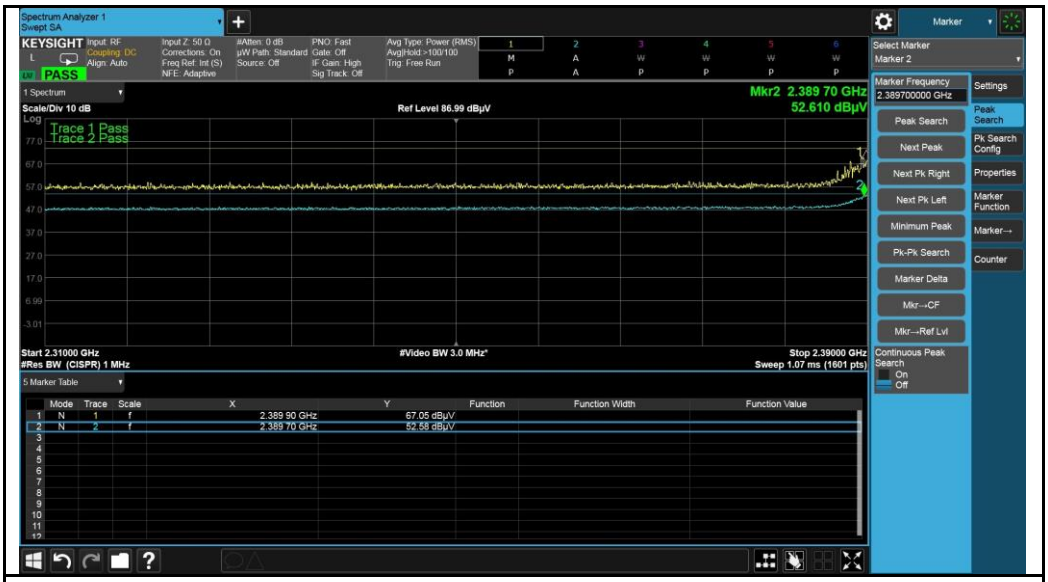
802.11b-2412MHz



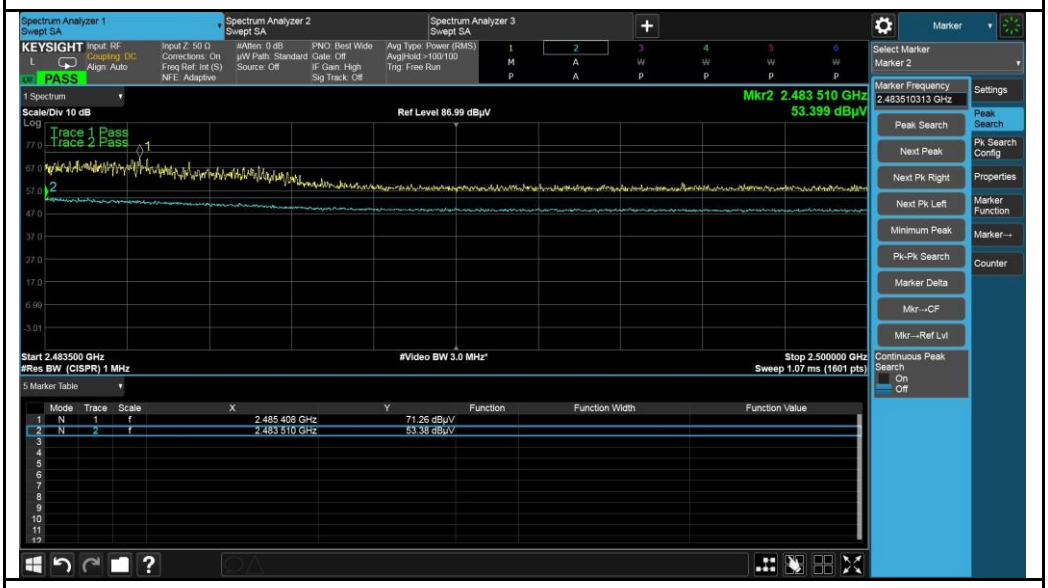
802.11b-2462MHz

802.11g-2412MHz

802.11g-2462MHz



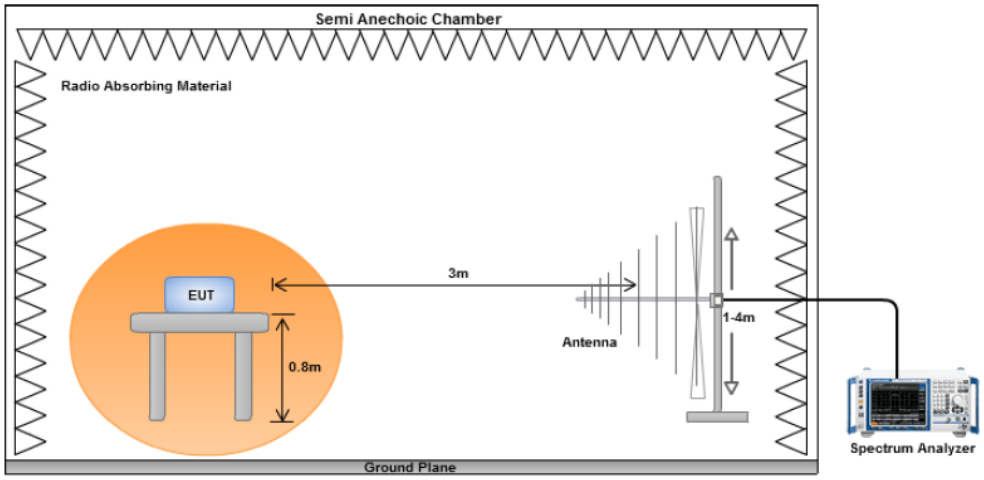
802.11HT20-2412MHz



802.11HT20-2462MHz

10.3 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 **Frequency range (MHz) / Field Strength (uV/m)** 30 – 88 / 100 88 – 216 / 150 216 960 / 200 Above 960 / 500	☒
Test Setup			
Procedure		1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.	
Remark		The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.	
Result		☒ Pass ☐ Fail	

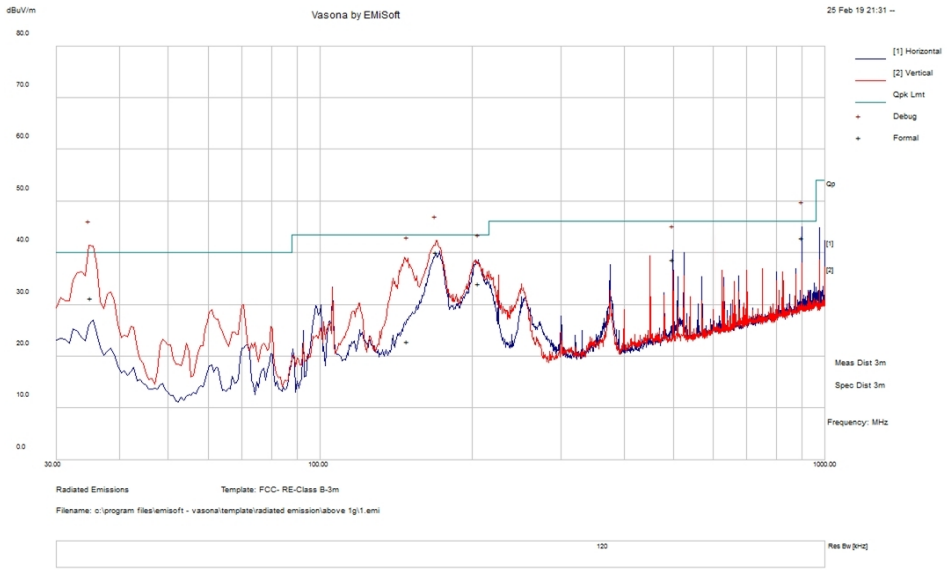
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26	Result	Pass
	Humidity (%)	47		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Gary Chou			
Test Date:	02/25/2019			
Remarks:	802.11n20, 2437MHz			

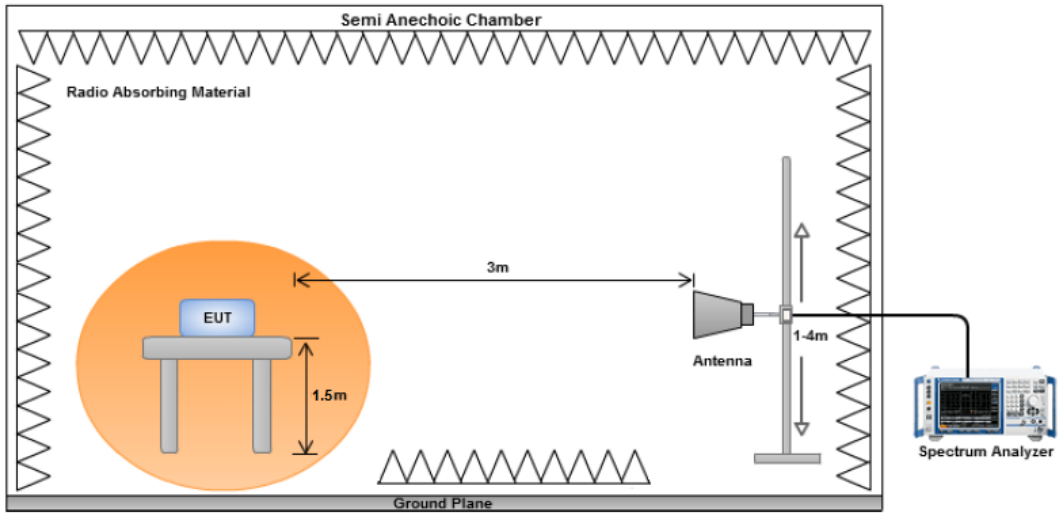


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
35.06844	36.66	11.2	-16.6	31.25	Quasi Max	V	228	174	40	-8.75	Pass
900.0247	40.25	15.95	-13.28	42.92	Quasi Max	H	105	195	46	-3.08	Pass
169.6525	51.64	12.35	-23.83	40.16	Quasi Max	V	210	19	43.5	-3.34	Pass
206.0225	45.99	12.68	-24.57	34.09	Quasi Max	H	177	77	43.5	-9.41	Pass
148.7161	34.04	12.21	-23.37	22.88	Quasi Max	H	102	261	43.5	-20.62	Pass
500.0234	42.81	14.17	-18.27	38.7	Quasi Max	H	113	77	46	-7.3	Pass

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

10.4 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		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 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. There isn't outstanding emission found at the edge of restricted frequency.	
Result		☒ Pass ☐ Fail	

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Gary Chou at 3m 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	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4824.07	50.43	4.12	-0.93	53.62	Peak Max	V	119	89	74	-20.38	Pass
1530.64	41.52	2.37	-6.33	37.56	Peak Max	H	180	53	74	-36.44	Pass
17863.59	34.64	8.02	8.53	51.19	Peak Max	V	164	209	74	-22.81	Pass
4824.07	46.18	4.12	-0.93	49.37	Average Max	V	119	89	54	-4.63	Pass
1530.64	28.35	2.37	-6.33	24.39	Average Max	H	180	53	54	-29.61	Pass
17863.59	22.39	8.02	8.53	38.94	Average Max	V	164	209	54	-15.06	Pass

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

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17956.26	39.24	7.91	8.71	55.86	Peak Max	H	199	15	74	-18.14	Pass
1529.68	41.15	2.37	-6.34	37.18	Peak Max	V	300	212	74	-36.82	Pass
4879.09	40.43	4.18	-0.99	43.62	Peak Max	V	253	60	74	-30.38	Pass
17956.26	26.28	7.91	8.71	42.9	Average Max	H	199	15	54	-11.1	Pass
1529.68	30.51	2.37	-6.34	26.54	Average Max	V	300	212	54	-27.46	Pass
4879.09	27.39	4.18	-0.99	30.58	Average Max	V	253	60	54	-23.42	Pass

Above 1GHz-25GHz – 802.11b – 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17565.68	38.41	8.24	7.84	54.49	Peak Max	V	345	346	74	-19.51	Pass
4924.4	40.27	4.17	-0.99	43.45	Peak Max	V	195	230	74	-30.55	Pass
7387.42	39.18	5.14	-0.51	43.81	Peak Max	V	238	169	74	-30.19	Pass
17565.68	26.43	8.24	7.84	42.51	Average Max	V	345	346	54	-11.49	Pass
4924.4	26.52	4.17	-0.99	29.7	Average Max	V	195	230	54	-24.3	Pass
7387.42	26.18	5.14	-0.51	30.81	Average Max	V	238	169	54	-23.19	Pass

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

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17436.26	39.29	8.22	7.54	55.05	Peak Max	V	191	29	74	-18.95	Pass
7237.65	38.34	5.16	-0.46	43.04	Peak Max	V	112	217	74	-30.96	Pass
4823.42	39.71	4.12	-0.93	42.9	Peak Max	V	267	18	74	-31.1	Pass
17436.26	26.29	8.22	7.54	42.05	Average Max	V	191	29	54	-11.95	Pass
7237.65	26.54	5.16	-0.46	31.24	Average Max	V	112	217	54	-22.76	Pass
4823.42	26.36	4.12	-0.93	29.55	Average Max	V	267	18	54	-24.45	Pass

Above 1GHz-25GHz – 802.11g – 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17797.93	38.45	8.09	8.32	54.86	Peak Max	H	281	163	74	-19.14	Pass
7262.8	38.61	5.16	-0.47	43.3	Peak Max	V	210	219	74	-30.7	Pass
4823.97	38.39	4.12	-0.93	41.58	Peak Max	V	295	116	74	-32.42	Pass
17797.93	26.52	8.09	8.32	42.93	Average Max	H	281	163	54	-11.07	Pass
7262.8	26.41	5.16	-0.47	31.1	Average Max	V	210	219	54	-22.9	Pass
4823.97	26.29	4.12	-0.93	29.48	Average Max	V	295	116	54	-24.52	Pass

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

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
16890.48	37.37	8.1	6.67	52.14	Peak Max	V	177	93	74	-21.86	Pass
7387.89	38.64	5.14	-0.51	43.27	Peak Max	V	305	198	74	-30.73	Pass
4922.26	39.19	4.22	-1.04	42.37	Peak Max	V	310	188	74	-31.63	Pass
16890.48	25.73	8.1	6.67	40.5	Average Max	V	177	93	54	-13.5	Pass
7387.89	26.45	5.14	-0.51	31.08	Average Max	V	305	198	54	-22.92	Pass
4922.26	26.53	4.22	-1.04	29.71	Average Max	V	310	188	54	-24.29	Pass

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

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17965.19	26.71	7.9	8.72	43.33	Average Max	H	214	313	54	-10.67	Pass
1530.15	28.28	2.37	-6.34	24.31	Average Max	H	159	285	54	-29.69	Pass
4826.06	26.43	4.13	-0.93	29.63	Average Max	V	201	350	54	-24.37	Pass
17965.19	39.67	7.9	8.72	56.29	Peak Max	H	214	313	74	-17.71	Pass
1530.15	41.15	2.37	-6.34	37.18	Peak Max	H	159	285	74	-36.82	Pass
4826.06	39.24	4.13	-0.93	42.44	Peak Max	V	201	350	74	-31.56	Pass

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

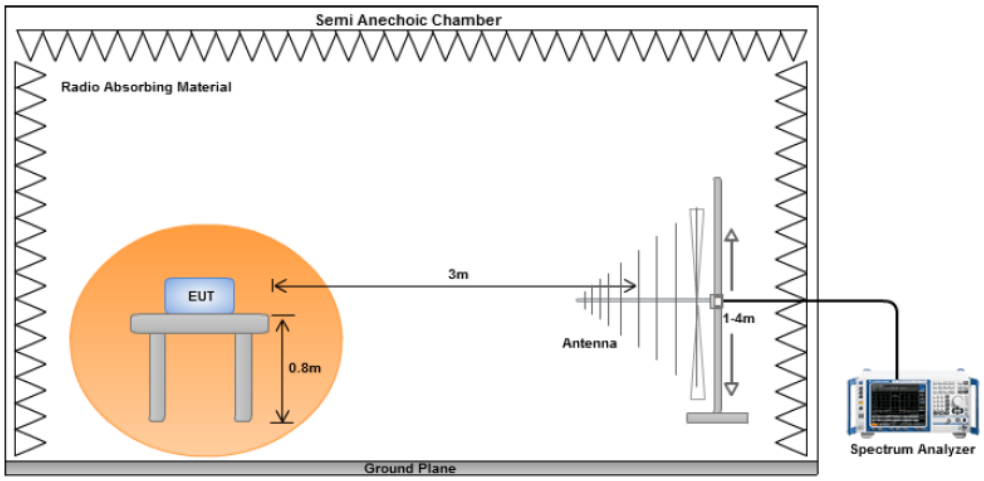
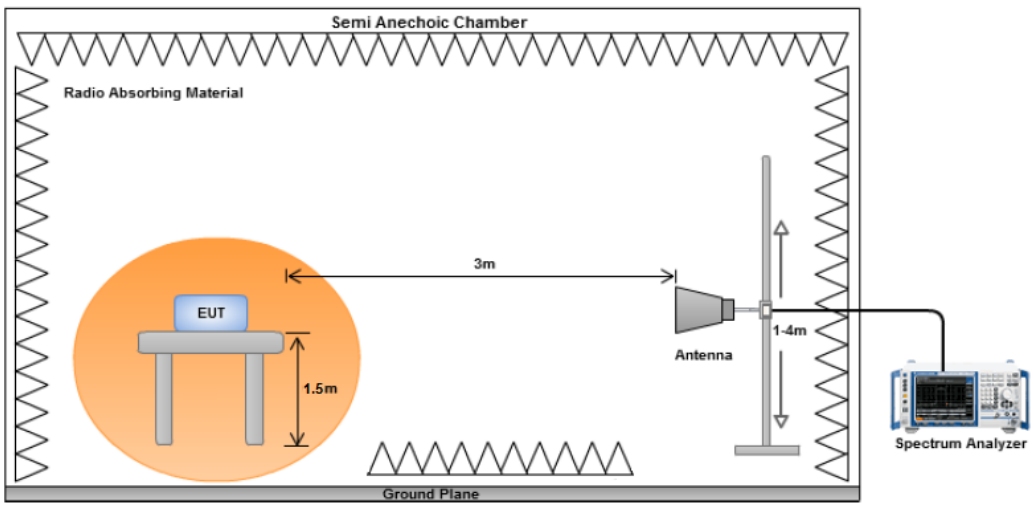
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
15850.66	38.56	7.79	5.75	52.1	Peak Max	V	117	188	74	-21.9	Pass
7315.05	38.42	5.15	-0.49	43.08	Peak Max	V	302	4	74	-30.92	Pass
4875.4	39.33	4.17	-0.99	42.51	Peak Max	V	138	158	74	-31.49	Pass
15850.66	26.42	7.79	5.75	39.96	Average Max	V	117	188	54	-14.04	Pass
7315.05	26.18	5.15	-0.49	30.84	Average Max	V	302	4	54	-23.16	Pass
4875.4	26.35	4.17	-0.99	29.53	Average Max	V	138	158	54	-24.47	Pass

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

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17223.41	39.4	8.2	7.5	55.1	Peak Max	H	115	194	74	-18.9	Pass
7386.16	38.52	5.15	-0.49	43.18	Peak Max	H	281	260	74	-30.82	Pass
4923.96	39.64	4.18	-0.9	42.92	Peak Max	H	142	216	74	-31.08	Pass
17223.41	27.54	8.2	7.5	43.24	Average Max	H	115	194	54	-10.76	Pass
7386.16	26.76	5.15	-0.49	31.42	Average Max	H	281	260	54	-22.58	Pass
4923.96	26.81	4.18	-0.9	30.09	Average Max	H	142	216	54	-23.91	Pass

10.5 Receiver Spurious Emissions

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>RSS GEN 7.3</td><td>a)</td><td>Radiated emission measurements shall be performed with the receiver antenna connected to the receiver antenna ports. The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least five times the highest tunable or local oscillator frequency, whichever is higher, without exceeding 40 GHz.
Spurious emissions from receivers shall not exceed the radiated emissions limits shown in table 3
<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>Test Setup</td><td colspan="3"> 
</td></tr>
</table>

Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.
Result	☒ Pass ☐ Fail

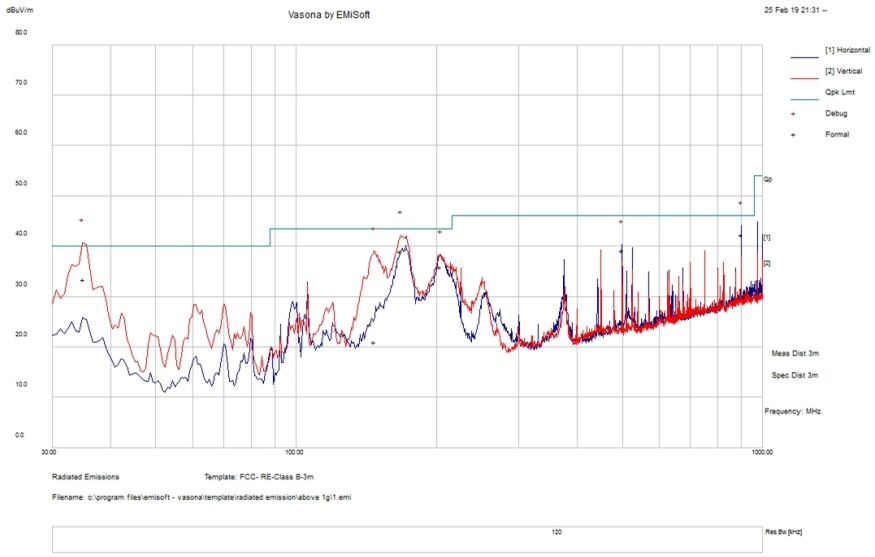
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26	Result	Pass
	Humidity (%)	47		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Gary Chou			
Test Date:	02/25/2019			
Remarks:	Receiver mode			



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
34.97125	38.85	11.2	-16.52	33.53	Quasi Max	V	108	249	40	-6.47	Pass
167.4244	50.41	12.33	-23.62	39.13	Quasi Max	V	175	9	43.5	-4.37	Pass
900.0247	39.7	15.95	-13.28	42.37	Quasi Max	H	107	234	46	-3.63	Pass
146.9696	32.26	12.2	-23.37	21.1	Quasi Max	H	105	279	43.5	-22.41	Pass
203.8534	47.54	12.66	-24.27	35.94	Quasi Max	H	120	120	43.5	-7.56	Pass
500.0131	43.32	14.17	-18.27	39.22	Quasi Max	H	118	101	46	-6.78	Pass

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

Radiated Emission Test Results (Above 1GHz)

Receiver mode

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
6193.6725	49.59	4.69	-0.34	53.95	Peak Max	V	118	356	74	-20.05	Pass
10043.873	40.51	5.93	1.35	47.79	Peak Max	H	100	34	74	-26.21	Pass
11000.946	42.87	6.13	2.08	51.08	Peak Max	H	119	45	74	-22.92	Pass
1000.03	51.16	1.88	-7.85	45.19	Peak Max	H	176	139	74	-28.81	Pass
6193.6725	37.32	4.69	-0.34	41.68	Average Max	V	118	356	54	-12.32	Pass
10043.873	28.35	5.93	1.35	35.63	Average Max	H	100	34	54	-18.37	Pass
11000.946	30.65	6.13	2.08	38.86	Average Max	H	119	45	54	-15.14	Pass
1000.03	41.98	1.88	-7.85	36.02	Average Max	H	176	139	54	-17.98	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Radiated Emissions						
50GHz Spectrum Analyzer	N9030B (PXA)	MY57140374	01/25/2019	1 Year	01/25/2020	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	03/09/2018	2 Year	03/09/2020	☑
Horn Antenna (1-18GHz)	3115	10SL0059	01/26/2018	2 Year	01/26/2020	☑
RF Pre-Amplifier (9kHz - 6.5GHz)	LPA-6-30	11170601	07/23/2018	1 Year	07/23/2019	☑
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/06/2018	1 Year	05/06/2019	☑

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