



# RF TEST REPORT



**Report No.:** FCC\_RF\_SL18011901-SFE-006-W52W58  
**Supersede Report No.:** N/A


Applicant	:	Lighthouse AI, Inc
Product Name	:	Lighthouse
Model No.	:	A1
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v02r01
FCC ID	:	2ALIS-A1
IC ID	:	22555-A1
Dates of test	:	02/20/2018 – 02/27/2018
Issue Date	:	02/28/2018
Test Result	:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Equipment complied with the specification <input checked="" type="checkbox"/>		
Equipment did not comply with the specification <input type="checkbox"/>		

<i>This Test Report is Issued Under the Authority of:</i>	
	
<b>Cipher</b>	<b>Chen Ge</b>
Test Engineer	Engineer Reviewer
<i>This test report may be reproduced in full only            Test result presented in this test report is applicable to the tested sample only</i>	

**Issued By:**  
**SIEMIC Laboratories**  
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## Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

### Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

### Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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## 1 Report Revision History

<i>Report No.</i>	<i>Report Version</i>	<i>Description</i>	<i>Issue Date</i>
FCC_RF_SL18011901-SFE-006-W52W58	None	Original	02/28/2018

## 2 Executive Summary

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

Company: Lighthouse AI, Inc  
Product: Lighthouse  
Model: A1

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1<sup>st</sup> page.

## 3 Customer information

Applicant Name	:	Lighthouse AI, Inc
Applicant Address	:	380 Portage Avenue, Palo Alto, CA
Manufacturer Name	:	Hon Hai Precision Industry CO, LTD (Foxconn)
Manufacturer Address	:	NANNING FUGUI PRECISION INDUSTRIAL CO.,LTD. B FACTORIES AREA,FOXCONN NANNING SCITECH PARK,NO.51,TONGLE, NANNING CITY, GUANGXI PROVINCE, CHINA-530031

## 4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

## 5 Modification

Index	Item	Description	Note
-	-	-	-

## 6 EUT Information

### 6.1 EUT Description

Product Name	:	Lighthouse
Model No.	:	A1
Trade Name	:	Lighthouse AI
Serial No.	:	A1003170012
Input Power	:	100-240VAC, 50/60Hz
Power Adapter Manu/Model	:	2ABS048F US
Power Adapter SN	:	11-16120136-00145
Product Hardware version	:	v3.2
Product Software version	:	build-alexandria-1079
Radio Hardware version	:	WCN-3660B-0-79WLNSP-TR-05-1
Radio Software version	:	CNSS.PR.2.0.1.2.c1-00021-M8936BAAAANAZW-1
Date of EUT received	:	02/06/2018
Equipment Class/ Category	:	DTS, UNII
Port/Connectors	:	None

### 6.2 Radio Description

Radio Type	802.11a	802.11n-20M	802.11n-40M
Operating Frequency	5180-5240MHz 5745-5825MHz	5180-5240MHz 5745-5825MHz	5190-5230MHz 5755-5795MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz	20MHz	40MHz
Number of Channels	9	9	4
Antenna Type	Dipole		
Antenna Gain (Peak)	5GHz: 5.8 dBi		
Antenna Connector Type	U.FL		
Note	Bluetooth, 2.4GHz and 5GHz radio does not transmit simultaneously.		

**EUT Power level setting**

<b>Mode</b>	<b>Frequency</b>	<b>Power Setting</b>
802.11-a	5180	14
802.11-a	5200	14
802.11-a	5240	14
802.11-n-20	5180	14
802.11-n-20	5200	14
802.11-n-20	5240	14
802.11-n-40	5190	14
802.11-n-40	5230	14
802.11-a	5745	14
802.11-a	5785	14
802.11-a	5825	14
802.11-n-20	5745	14
802.11-n-20	5785	14
802.11-n-20	5825	14
802.11-n-40	5755	14
802.11-n-40	5795	14

## 7 Supporting Equipment/Software and cabling Description

### 7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	N/A	3YZQ162	Dell	-

### 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	USB	EUT	USB	Laptop	USB	1	Unshielded

### 7.3 Test Software Description

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



## 8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01r02	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.4 – 2014	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Antenna Requirement	FCC	15.203	-	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01r02	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Frequency Stability	FCC	15.407 (g)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
User Manual	FCC	-	-	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A

Remark	<ol style="list-style-type: none"> <li>All measurement uncertainties are not taken into consideration for all presented test result.</li> <li>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.</li> </ol>
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## 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
<b>Expanded Uncertainty (K=2)</b>					<b>3.856266</b>

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
<b>Expanded Uncertainty (K=2)</b>					<b>6.0118262</b>

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
<b>Expanded Uncertainty (K=2)</b>					<b>8.4726</b>

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
<b>Expanded Uncertainty (K=2)</b>					<b>0.952174</b>

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

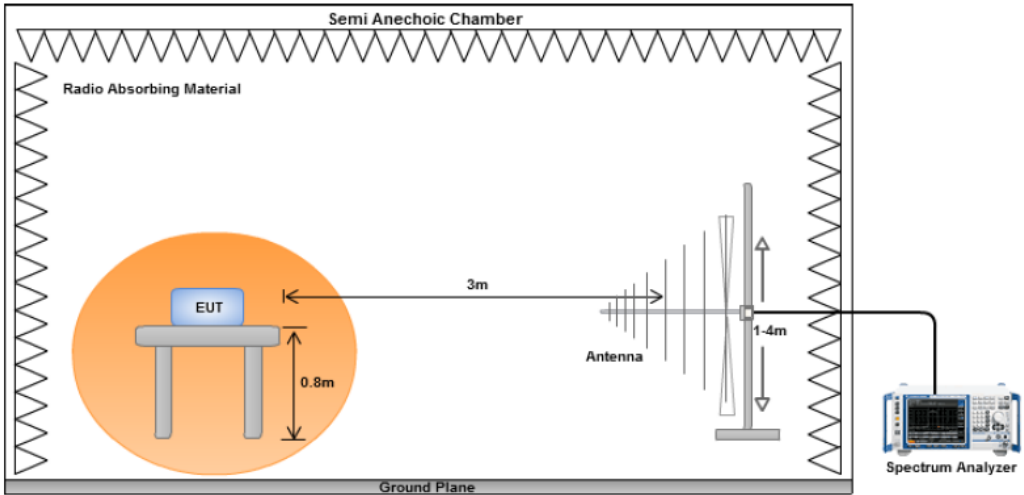
## 10 Measurements, Examination and Derived Results

### 10.1 Antenna Requirement

Spec	Item	Requirement	Applicable
15.203	-	<p>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.</p> <p>Antenna requirement must meet at least one of the following:</p> <p>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.</p>	<input checked="" type="checkbox"/>
Remark	All the Antennas use a unique type of connector to attach to the device.		
Result	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL		

## 10.2 Radiated Emissions below 1GHz

### Requirement(s):

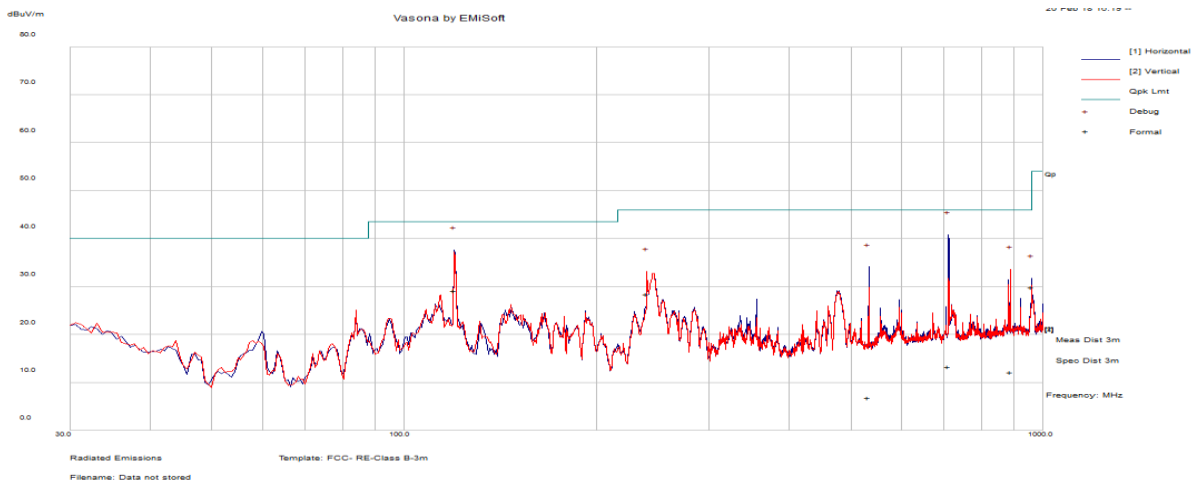
Spec	Requirement	Applicable										
47CFR§ 15.407(b) 15.209 (a)	<p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (uV/m)</th> </tr> </thead> <tbody> <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> </tbody> </table>	Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	☒
Frequency range (MHz)	Field Strength (uV/m)											
30 – 88	100											
88 – 216	150											
216 960	200											
Above 960	500											
Test Setup	 <p>The diagram shows a semi-anechoic chamber with radio absorbing material on the walls. Inside, an EUT (Equipment Under Test) is placed on a stand that is 0.8m high. A horizontal line indicates a distance of 3m between the EUT and a horn antenna. The antenna is mounted on a vertical pole that can be adjusted to a height of 1-4m. A spectrum analyzer is connected to the antenna to measure the radiated emissions.</p>											
Procedure	<ol style="list-style-type: none"> <li>1. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>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: <ol style="list-style-type: none"> <li>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>3. A Quasi-peak measurement was then made for that frequency point.</li> <li>4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol>											
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 CIPHER at 10m chamber.

### Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz		Result	Pass
Environmental Conditions:	Temp (°C):	26		
	Humidity (%)	47		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	CIPHER			
Test Date:	02/20/2018 – 02/27/2018			
Remarks:	802.11n40, 5755MHz			



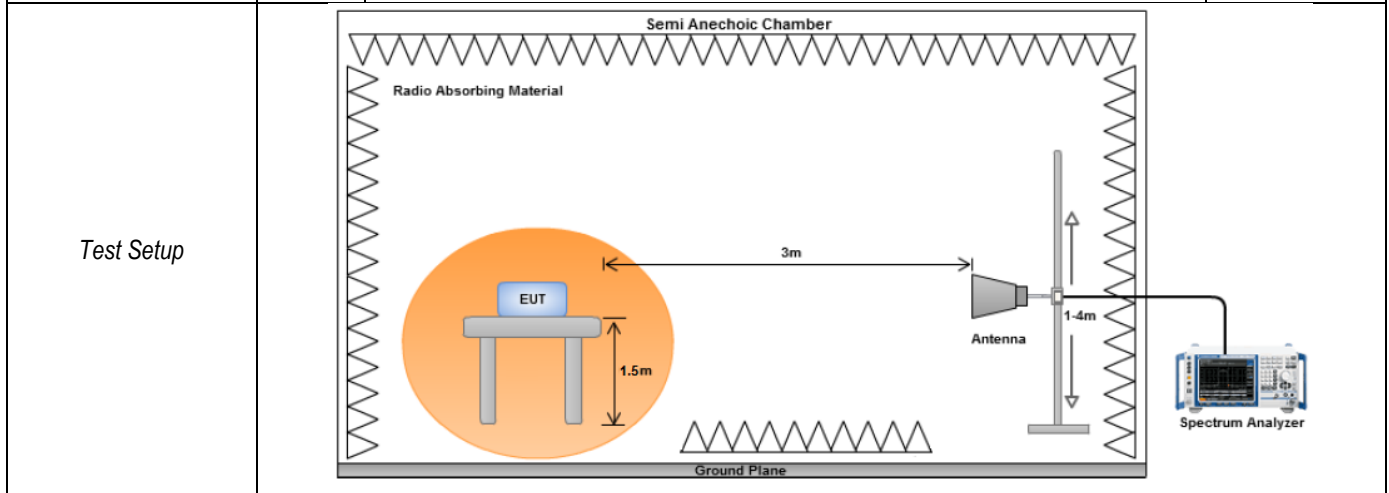
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
710.88	18.54	10	-15.27	13.27	Quasi Max	H	120	130	46	-32.73	Pass
119.97	42.05	10	-22.87	29.18	Quasi Max	H	254	103	43.5	-14.32	Pass
533.25	15.01	10	-18.13	6.88	Quasi Max	H	329	138	46	-39.12	Pass
888.88	16.42	10	-14.2	12.22	Quasi Max	V	195	87	46	-33.78	Pass
240.01	43.48	10	-25.09	28.4	Quasi Max	V	134	291	46	-17.6	Pass
959.99	33.41	10	-13.55	29.86	Quasi Max	H	130	189	46	-16.14	Pass

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

### 10.3 Radiated Spurious Emissions above 1GHz

**Requirement(s):**

Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6)	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	<input checked="" type="checkbox"/>
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.	<input type="checkbox"/>
	(3)	For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.	<input type="checkbox"/>
	(4)	For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.	<input checked="" type="checkbox"/>
	(5)	Restricted band, emission must also comply with the radiated emission limits specified in 15.209	<input checked="" type="checkbox"/>



<b>Procedure</b>	<ol style="list-style-type: none"> <li>1. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>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:             <ol style="list-style-type: none"> <li>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>3. An average measurement was then made for that frequency point.</li> <li>4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol>
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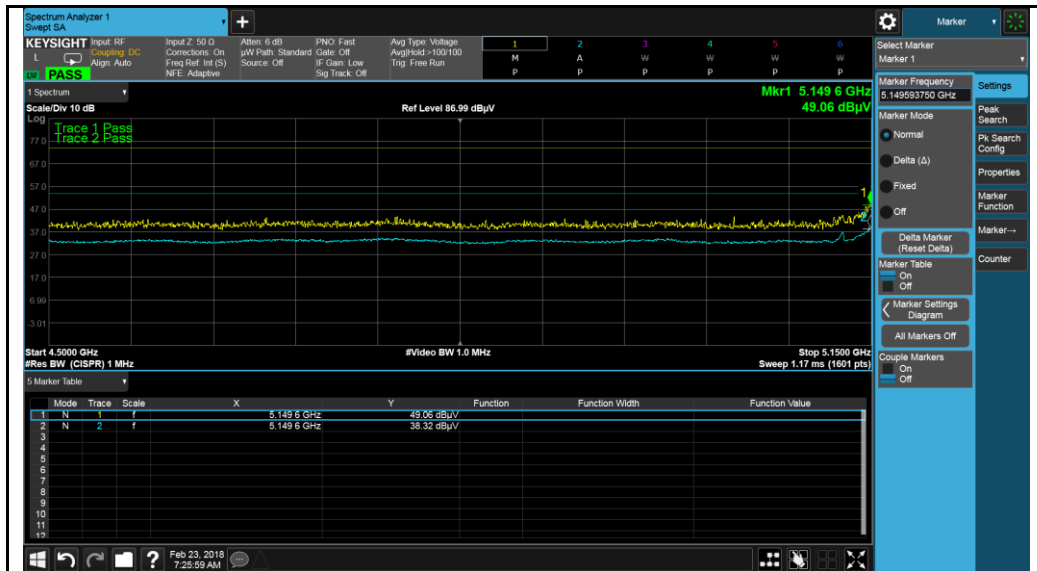
<b>Remark</b>	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.
<b>Result</b>	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

**Test Data**     Yes (See below)       N/A

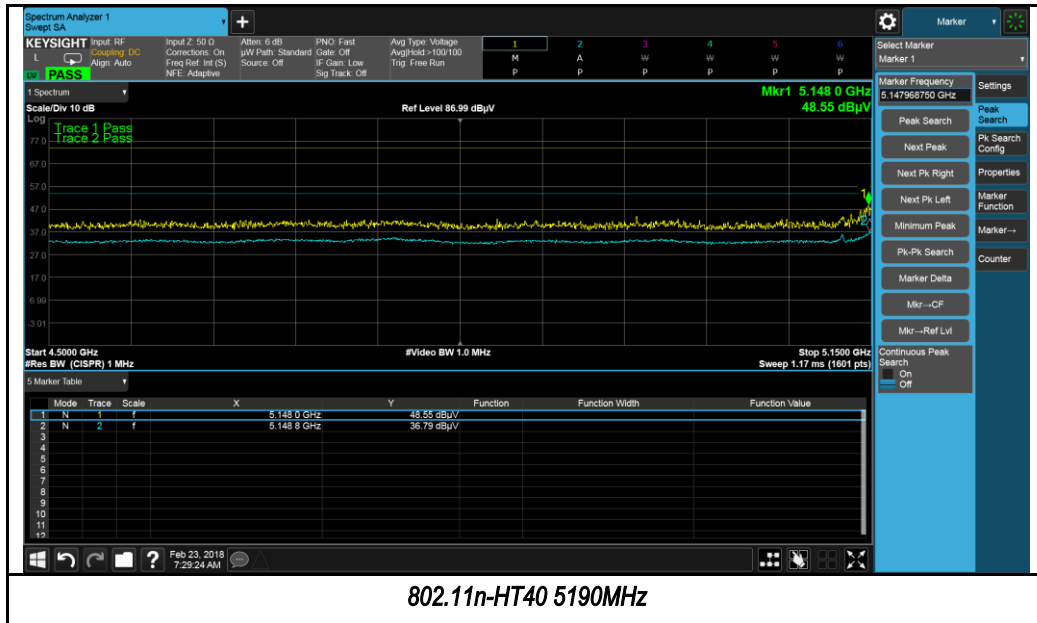
**Test Plot**     Yes (See below)       N/A

**Test was done by CIPHER at 10m chamber.**

**Restricted Band Measurement Plots:**







## Radiated Emission Test Results (Above 1GHz)

### 1GHz-40GHz – 802.11a – 5180MHz

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
17921.03	41.45	9.13	8.5	59.08	Peak Max	H	197	58	74	-14.92	Pass
1683.1	71.53	2.92	-14.14	60.31	Peak Max	H	141	63	74	-13.69	Pass
10483.5	42.99	7.23	0.34	50.56	Peak Max	H	227	306	74	-23.44	Pass
17921.03	29.63	9.13	8.5	47.26	Average Max	H	197	58	54	-6.74	Pass
1683.1	51.58	2.92	-14.14	40.36	Average Max	H	141	63	54	-13.64	Pass
10483.5	31.31	7.23	0.34	38.88	Average Max	V	383	183	54	-15.12	Pass

### 1GHz-40GHz – 802.11a – 5200MHz

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
17391.4	41.21	9.01	7.84	58.06	Peak Max	H	138	302	74	-15.94	Pass
1684.79	70.04	2.92	-14.12	58.84	Peak Max	H	139	353	74	-15.16	Pass
11584.83	43.31	7.55	2.01	52.87	Peak Max	V	158	164	74	-21.13	Pass
17391.4	29.39	9.01	7.84	46.24	Average Max	H	138	302	54	-7.76	Pass
1684.79	50.32	2.92	-14.12	39.12	Average Max	H	139	353	54	-14.88	Pass
11584.83	31.14	7.55	2.01	40.7	Average Max	V	158	164	54	-13.3	Pass

### 1GHz-40GHz – 802.11a – 5240MHz

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
17910.24	41.9	9.13	8.56	59.59	Peak Max	V	229	294	74	-14.41	Pass
1684.32	71.44	2.92	-14.12	60.24	Peak Max	H	169	43	74	-13.76	Pass
11501.18	43.38	7.6	1.8	52.78	Peak Max	H	152	357	74	-21.22	Pass
17910.24	29.54	9.13	8.56	47.23	Average Max	H	150	276	54	-6.77	Pass
1684.32	51.04	2.92	-14.12	39.84	Average Max	H	169	43	54	-14.16	Pass
11501.18	31.53	7.6	1.8	40.93	Average Max	H	152	357	54	-13.07	Pass

**1GHz-40GHz – 802.11n-20M – 5180MHz**

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
17947.49	41.1	9.14	8.36	58.6	Peak Max	H	267	303	74	-15.4	Pass
1684.58	71.33	2.92	-14.12	60.13	Peak Max	H	251	30	74	-13.87	Pass
10486.42	43.08	7.23	0.35	50.66	Peak Max	H	221	62	74	-23.34	Pass
17947.49	29.37	9.14	8.36	46.87	Average Max	V	386	327	54	-7.13	Pass
1684.58	50.62	2.92	-14.12	39.42	Average Max	H	251	30	54	-14.58	Pass
10486.42	31.51	7.23	0.35	39.09	Average Max	V	98	29	54	-14.91	Pass

**1GHz-40GHz – 802.11n-20M – 5200MHz**

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
17596.05	40.82	9.05	8.04	57.91	Peak Max	H	248	161	74	-16.09	Pass
1683.51	71.92	2.92	-14.13	60.71	Peak Max	H	139	53	74	-13.29	Pass
11203.4	43.05	7.85	2.2	53.1	Peak Max	V	353	193	74	-20.9	Pass
17596.05	29.17	9.05	8.04	46.26	Average Max	V	175	116	54	-7.74	Pass
1683.51	51.89	2.92	-14.13	40.68	Average Max	H	139	53	54	-13.32	Pass
11203.4	31.36	7.85	2.2	41.41	Average Max	H	99	343	54	-12.59	Pass

**1GHz-40GHz – 802.11n-20M – 5240MHz**

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
17676.43	41.97	9.07	8.39	59.43	Peak Max	H	177	83	74	-14.57	Pass
1683.47	71.17	2.92	-14.13	59.96	Peak Max	H	140	15	74	-14.04	Pass
8427.62	43.05	6.58	0	49.63	Peak Max	H	228	213	74	-24.37	Pass
17676.43	29.41	9.07	8.39	46.87	Average Max	H	177	83	54	-7.13	Pass
1683.47	51.16	2.92	-14.13	39.95	Average Max	H	140	15	54	-14.05	Pass
8427.63	31.57	6.58	0	38.15	Average Max	H	228	213	54	-15.85	Pass

**1GHz-40GHz – 802.11n-40M – 5190MHz**

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
17978.1	41.14	9.15	8.2	58.49	Peak Max	V	223	57	74	-15.51	Pass
1641.36	69.57	2.87	-14.6	57.84	Peak Max	H	117	121	74	-16.16	Pass
11315.23	43.23	7.75	1.89	52.87	Peak Max	H	244	217	74	-21.13	Pass
17978.1	29.38	9.15	8.2	46.73	Average Max	H	145	187	54	-7.27	Pass
1641.36	45.28	2.87	-14.6	33.55	Average Max	H	117	121	54	-20.45	Pass
11315.23	31.55	7.75	1.89	41.19	Average Max	V	143	59	54	-12.81	Pass

**1GHz-40GHz – 802.11n-40M – 5230MHz**

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
17753.25	42.17	9.09	8	59.26	Peak Max	H	146	256	74	-14.74	Pass
1682.37	70.82	2.92	-14.14	59.6	Peak Max	H	183	50	74	-14.4	Pass
11093.68	43.21	7.94	1.89	53.04	Peak Max	V	281	269	74	-20.96	Pass
17753.25	29.72	9.09	8	46.81	Average Max	H	146	256	54	-7.19	Pass
1682.37	50.35	2.92	-14.14	39.13	Average Max	H	183	50	54	-14.87	Pass
11093.68	31.29	7.94	1.89	41.12	Average Max	H	129	283	54	-12.88	Pass

**1GHz-40GHz – 802.11a – 5745MHz**

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
17878.07	41.18	9.12	8.39	58.69	Peak Max	V	345	320	74	-15.31	Pass
1683.5	70.15	2.92	-14.13	58.94	Peak Max	H	211	64	74	-15.06	Pass
7294.63	42.93	5.91	0.1	48.94	Peak Max	V	165	348	74	-25.06	Pass
17878.07	29.37	9.12	8.39	46.88	Average Max	H	108	282	54	-7.12	Pass
1683.5	50.16	2.92	-14.13	38.95	Average Max	H	211	64	54	-15.05	Pass
7294.63	31.05	5.91	0.1	37.06	Average Max	V	165	348	54	-16.94	Pass

**1GHz-40GHz - 802.11a– 5785MHz**

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
17715.67	40.84	9.08	8.34	58.26	Peak Max	V	259	124	74	-15.74	Pass
1683.23	71.85	2.92	-14.14	60.63	Peak Max	H	150	13	74	-13.37	Pass
8513.69	44.03	6.71	-0.17	50.57	Peak Max	H	247	289	74	-23.43	Pass
17715.67	29.21	9.08	8.34	46.63	Average Max	H	181	302	54	-7.37	Pass
1683.23	51.92	2.92	-14.14	40.7	Average Max	H	150	13	54	-13.3	Pass
8513.69	31.86	6.71	-0.17	38.4	Average Max	V	351	31	54	-15.6	Pass

**1GHz-40GHz - 802.11a - 5825MHz**

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
17681.66	41.14	9.07	8.41	58.62	Peak Max	V	98	262	74	-15.38	Pass
1683.69	71.57	2.92	-14.13	60.36	Peak Max	H	161	17	74	-13.64	Pass
11381.01	43.42	7.7	2.26	53.38	Peak Max	H	258	190	74	-20.62	Pass
17681.66	29.44	9.07	8.41	46.92	Average Max	H	162	169	54	-7.08	Pass
1683.69	51.49	2.92	-14.13	40.28	Average Max	H	161	17	54	-13.72	Pass
11381.01	31.61	7.7	2.26	41.57	Average Max	V	215	311	54	-12.43	Pass

**1GHz-40GHz – 802.11n-20M – 5745MHz**

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
17384.09	41.36	9.01	7.76	58.13	Peak Max	H	99	284	74	-15.87	Pass
1683.74	72.54	2.92	-14.13	61.33	Peak Max	H	137	36	74	-12.67	Pass
11092.24	42.98	7.94	1.89	52.81	Peak Max	V	100	131	74	-21.19	Pass
17384.09	29.67	9.01	7.76	46.44	Average Max	H	99	284	54	-7.56	Pass
1683.74	52.56	2.92	-14.13	41.35	Average Max	H	137	36	54	-12.65	Pass
11092.24	31.32	7.94	1.89	41.15	Average Max	V	100	131	54	-12.85	Pass

**1GHz-40GHz - 802.11n-20M– 5785MHz**

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
1681.96	64.46	2.92	-14.15	53.23	Peak Max	H	147	103	74	-20.77	Pass
17713.29	40.78	9.08	8.37	58.23	Peak Max	H	128	294	74	-15.77	Pass
11570.32	42.89	7.56	1.98	52.43	Peak Max	V	113	275	74	-21.57	Pass
1681.96	40.15	2.92	-14.15	28.92	Average Max	H	147	103	54	-25.08	Pass
17713.29	29.24	9.08	8.37	46.69	Average Max	H	128	294	54	-7.31	Pass
11570.32	30.67	7.56	1.98	40.21	Average Max	V	113	275	54	-13.79	Pass

**1GHz-40GHz - 802.11n-20M - 5825MHz**

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
17384.09	41.36	9.01	7.76	58.13	Peak Max	H	99	284	74	-15.87	Pass
1683.74	72.54	2.92	-14.13	61.33	Peak Max	H	137	36	74	-12.67	Pass
11092.24	42.98	7.94	1.89	52.81	Peak Max	V	100	131	74	-21.19	Pass
17384.09	29.67	9.01	7.76	46.44	Average Max	H	99	284	54	-7.56	Pass
1683.74	52.56	2.92	-14.13	41.35	Average Max	H	137	36	54	-12.65	Pass
11092.24	31.32	7.94	1.89	41.15	Average Max	V	100	131	54	-12.85	Pass

**1GHz-40GHz – 802.11n-40M – 5755MHz**

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
1681.96	62.93	2.92	-14.15	51.7	Peak Max	H	118	356	74	-22.3	Pass
17723.99	41.27	9.08	8.27	58.62	Peak Max	H	103	197	74	-15.38	Pass
11509.84	42.37	7.59	1.82	51.78	Peak Max	H	195	350	74	-22.22	Pass
1681.96	39.42	2.92	-14.15	28.19	Average Max	H	118	356	54	-25.81	Pass
17723.99	29.28	9.08	8.27	46.63	Average Max	H	103	197	54	-7.37	Pass
11509.84	30.7	7.59	1.82	40.11	Average Max	H	195	350	54	-13.89	Pass

**1GHz-40GHz - 802.11n-40M– 5795MHz**
















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
1681.99	62.5	2.92	-14.15	51.27	Peak Max	H	205	110	74	-22.73	Pass
17970	41.21	9.15	8.24	58.6	Peak Max	H	114	252	74	-15.4	Pass
11588.49	42.18	7.55	2.02	51.75	Peak Max	H	117	42	74	-22.25	Pass
1681.99	39.01	2.92	-14.15	27.78	Average Max	H	205	110	54	-26.22	Pass
17970	29.33	9.15	8.24	46.72	Average Max	H	114	252	54	-7.28	Pass
11588.49	30.36	7.55	2.02	39.93	Average Max	H	117	42	54	-14.07	Pass








**Annex A. TEST INSTRUMENT**

<i>Instrument</i>	<i>Model</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Cycle</i>	<i>Cal Due</i>	<i>In use</i>
<b><i>Radiated Emissions</i></b>						
Keysight EXA 44GHz Spectrum Analyzer	N9010A	MY5144011 2	11/02/2017	1 Year	11/02/2018	<input checked="" type="checkbox"/>
Pre-Amplifier (1-40GHz)	SAS-474	579	05/04/2017	1 Year	05/04/2018	<input checked="" type="checkbox"/>
Preamplifier (100KHz-7GHz)	LPA-6-30	11170602	02/09/2018	1 Year	02/09/2019	<input checked="" type="checkbox"/>
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	01/13/2018	1 Year	01/13/2019	<input checked="" type="checkbox"/>
Horn Antenna (1-26.5GHz)	3115	10SL0059	08/11/2017	1 Year	08/11/2018	<input checked="" type="checkbox"/>



## 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		<b>Radio &amp; Telecommunications Terminal Equipment:</b> EN45001 – EN ISO/IEC 17025
		<b>Electromagnetic Compatibility:</b> 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		<b>Radio:</b> Scope A – All Radio Standard Specification in Category I
		<b>Telecom:</b> CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		<p><b>Radio:</b> A1. Terminal equipment for purpose of calling</p> <p><b>Telecom:</b> B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law</p>
Korea CAB Accreditation		<p><b>EMI:</b> KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI</p> <p><b>EMS:</b> 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</p>
		<p><b>Radio:</b> 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</p> <p><b>Telecom:</b> 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</p>
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		<p>R-3083: Radiation 3 meter site</p> <p>C-3421: Main Ports Conducted Interference Measurement</p> <p>T-1597: Telecommunication Ports Conducted Interference Measurement</p>
Australia CAB Recognition		<p><b>EMC:</b> AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4</p>
		<p><b>Radio communications:</b> 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</p>
		<p><b>Telecommunications:</b> 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</p>
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