

# RF TEST REPORT



Report No.: RF\_FCC\_SL18113001-RAD-001\_Co-Location\_Rev1.0  
Supersede Report No.: RF\_FCC\_SL18113001-RAD-001\_Co-Location

Applicant	:	Radius Networks, Inc.
Product Name	:	RadPoint NFC Reader
Model No.	:	RNU-C01
Test Standard	:	FCC 15.247 FCC 15.225
Test Method	:	ANSI C63.10 2013 KDB 558074 D01 DTS Meas Guidance v05r01
RFID FCC ID	:	2ABYU-RNUC01
BT FCC ID	:	2AA9B10
Dates of test	:	02/01/2019 - 02/11/2019
Issue Date	:	03/05/2019
Test Result	:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Equipment complied with the specification		[X]
Equipment did not comply with the specification		[ ]

This Test Report is Issued Under the Authority of:

Shuo Zhang	Chen Ge
RF Test Engineer	Engineer Reviewer
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only	

Issued By:  
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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	EMC, RF/Wireless, Telecom, Safety
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 Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

## **CONTENTS**

<b>1</b>	<b>REPORT REVISION HISTORY .....</b>	<b>4</b>
<b>2</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>5</b>
<b>3</b>	<b>CUSTOMER INFORMATION .....</b>	<b>5</b>
<b>4</b>	<b>TEST SITE INFORMATION .....</b>	<b>5</b>
<b>5</b>	<b>MODIFICATION .....</b>	<b>5</b>
<b>6</b>	<b>EUT INFORMATION .....</b>	<b>6</b>
6.1	EUT Description .....	6
6.2	Radio Description .....	6
<b>7</b>	<b>SUPPORTING EQUIPMENT/SOFTWARE AND CABLING DESCRIPTION .....</b>	<b>7</b>
7.1	Supporting Equipment .....	7
7.2	Cabling Description .....	7
7.3	Test Software Description .....	7
<b>8</b>	<b>TEST SUMMARY .....</b>	<b>8</b>
<b>9</b>	<b>MEASUREMENT UNCERTAINTY .....</b>	<b>9</b>
<b>10</b>	<b>MEASUREMENTS, EXAMINATION AND DERIVED RESULTS .....</b>	<b>10</b>
10.1	Radiated Measurements .....	10
10.1.1	Radiated Measurements 30MHz to 1GHz .....	10
10.1.2	Radiated Spurious Emissions between 1GHz-25GHz .....	12
	<b>ANNEX A. TEST INSTRUMENT .....</b>	<b>14</b>
	<b>ANNEX B. SIEMIC ACCREDITATION .....</b>	<b>15</b>

## 1 Report Revision History

Report No.	Report	Description	Issue Date
RF_FCC_SL18113001-RAD-001_Co-Location	None	Original	02/11/2019
RF_FCC_SL18113001-RAD-001_Co-Location_Rev1.0	1.0	Updated per TCB comments	03/05/2019

## 2 Executive Summary

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

Company: Radius Networks, Inc.  
Product: RadPoint NFC Reader  
Model: RNU-C01

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	Radius Networks, Inc.
Applicant Address	3255 Grace St NW, Washington, DC 20007
Manufacturer Name	Radius Networks, Inc.
Manufacturer Address	3255 Grace St NW, Washington, DC 20007

## 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-2
VCCI Test Site No.	:	A0133

## 5 Modification

Index	Item	Description	Note
-	-	-	-
-	-	-	-

## 6 EUT Information

### 6.1 EUT Description

Product Name	RadPoint NFC Reader
Model No.	RNU-C01
Trade Name	Radius Networks, Inc.
Serial No.	N/A
Input Power	5V DC via USB
Date of EUT received	01/01/2019
Equipment Class/ Category	DTS, RFID
Port/Connectors	USB C
Remark	The RNU-C01 RadPoint Reader is high performance fully NFC compliant card reader that enables a connected host computer to read loyalty (VAS) data from Type 2 and Type 4 NFC Tags, Apple Wallet cards, and Google Pay cards.

### 6.2 Radio Description

Bluetooth LE:

Radio Type	Bluetooth (Ver4.1)
Operating Frequency	2402MHz-2480MHz
Modulation	GFSK
Channel Spacing	2MHz
Antenna Type	PCB Antenna
Antenna Gain	-1 dBi
Note	N/A

RFID:

Radio:

Radio Type	RFID
Operating Frequency	13.56MHz
Modulation	ASK (13.56MHz)
Channel Spacing	None
Antenna Type	Loop
Antenna Connector Type	N/A

## 7 Supporting Equipment/Software and cabling Description

### 7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	N17Q1	NXGNPAA0167300AA1C7600	Acer	To Power up the EUT
2	Laptop Power Supply	PA-1450-26	N/A	LITEON	N/A

### 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 to USB C	Laptop	USB	EUT	USB C	1	Unshielded	-

### 7.3 Test Software Description

Test Item	Software	Description
RF Testing	Tera term	Set the EUT to transmit continuously in different test mode

## 8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Band Edge and Radiated Spurious Emissions	FCC	15.247(d) 15.255	FCC	ANSI C63.10:2013 KDB 558074 D01 15.247 Meas Guidance v05	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Remark	<ol style="list-style-type: none"> <li>All measurement uncertainties do not take into consideration for all presented test results.</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>				



## 9 Measurement Uncertainty

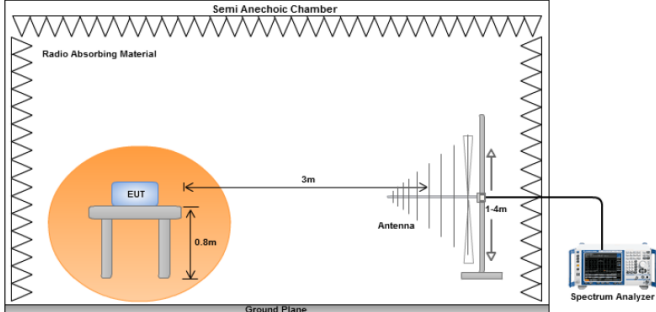
Emissions			
Test Item	Frequency Range	Description	Uncertainty
AC Conducted Emissions	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
RF conducted measurement	150KHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±0.95dB
Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB
Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB

## 10 Measurements, examination and derived results

### 10.1 Radiated Measurements

#### 10.1.1 Radiated Measurements 30MHz to 1GHz

Requirement(s):

Spec	Requirement	Applicable										
47 CFR §15.225	<div>Operation within the band 13.110–14.010 MHz: (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters. (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.</div> <table><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	<div><input checked="" type="checkbox"/></div>
Frequency range (MHz)	Field Strength (uV/m)											
30 – 88	100											
88 – 216	150											
216 960	200											
Above 960	500											
Test Setup												
Procedure	<div><div>1. The EUT was switched on and allowed to warm up to its normal operating condition.</div><div>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:<div><div>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</div><div>b. The EUT was then rotated to the direction that gave the maximum emission.</div><div>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</div></div></div><div>3. A Quasi-peak measurement was then made for that frequency point.</div><div>4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</div></div>											
Test Date	01/28/2019 – 01/30/2019	<div>Environmental conditions</div> <div>Temperature20.1°C</div> <div>Relative Humidity36%</div> <div>Atmospheric Pressure1026mbar</div>										
Remark	-											
Result	<div><input checked="" type="checkbox"/> Pass</div> <div><input type="checkbox"/> Fail</div>											

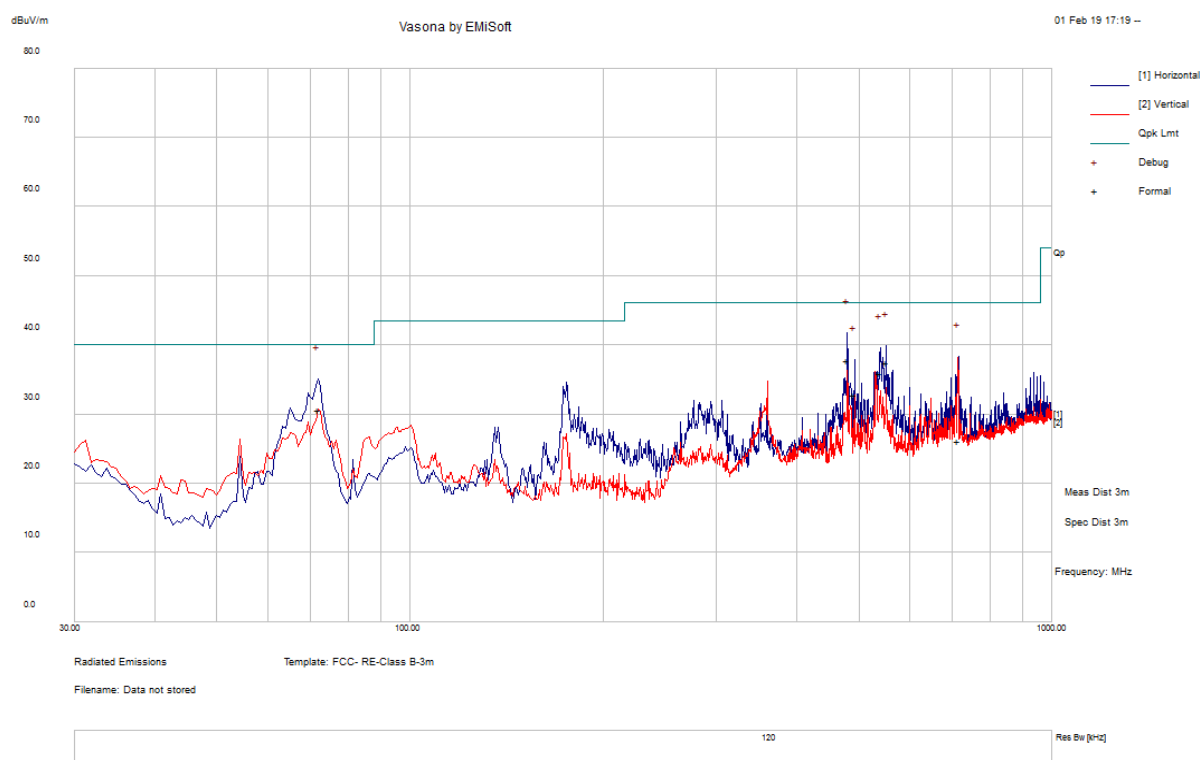
Test Data    ☒ Yes (See below)      ☐ N/A

Test Plot    ☒ Yes (See below)      ☐ N/A

Test was done by Shuo Zhang at 10-meter chamber.

Test specification:	Radiated Emissions			
Mains Power:	5V USB		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Shuo Zhang			
Test Date:	01/28/2019			
Remarks:	RFID and BLE radio transmit simultaneously			

**$f=30\text{MHz} - 1000\text{MHz}$  plot and 3-meter distance**

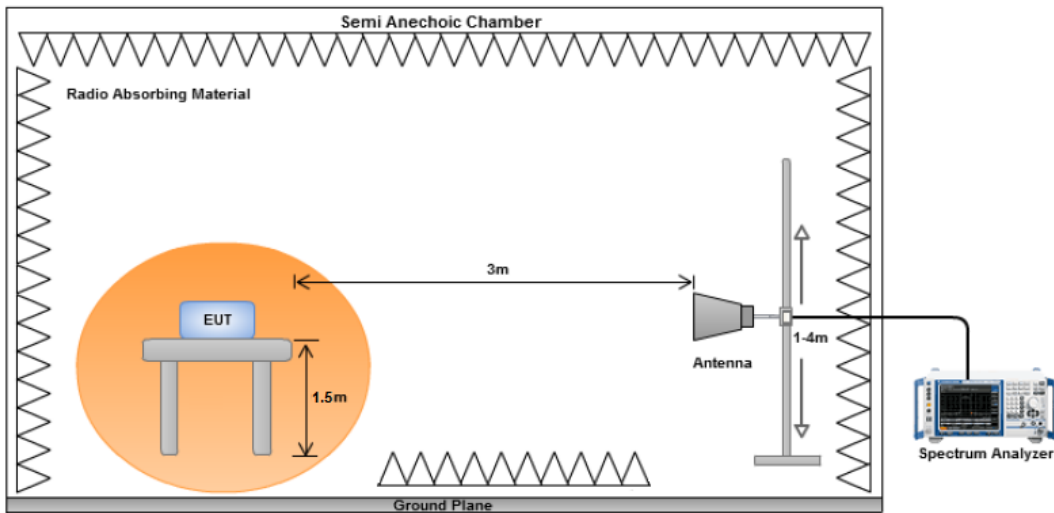


**$f=30\text{MHz} - 1000\text{MHz}$  Measurements**

Frequency MHz	Raw dBuV/m	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
480.01	42.67	14.22	-19.06	37.84	Quasi Max	H	233	56	46	-8.16	Pass
71.95	47	11.59	-27.95	30.64	Quasi Max	H	260	322	40	-9.36	Pass
552.01	41.05	14.45	-18.03	37.47	Quasi Max	H	197	283	46	-8.53	Pass
539.97	40.18	14.49	-18.68	36	Quasi Max	H	195	91	46	-10.01	Pass
714.67	26.78	15.2	-15.86	26.12	Quasi Max	H	104	298	46	-19.88	Pass
491.95	37.41	14.21	-18.82	32.79	Quasi Max	H	239	187	46	-13.21	Pass

### 10.1.2 Radiated Spurious Emissions between 1GHz-25GHz

#### Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d)	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  <input type="checkbox"/> 20 dB down <input checked="" type="checkbox"/> 30 dB down	<input checked="" type="checkbox"/>
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	<input type="checkbox"/>
Test Setup			
Procedure	<ol style="list-style-type: none"> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>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>Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>The EUT was then rotated to the direction that gave the maximum emission.</li> <li>Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>An average measurement was then made for that frequency point.</li> <li>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 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	<input checked="" type="checkbox"/> Pass		

Test Data    ☒ Yes (See below)      ☐ N/A

Test Plot    ☐ Yes (See below)      ☒ N/A

Test was done by Shuo Zhang at 10-meter chamber.
















Test specification:	Radiated Emissions			
Mains Power:	5V USB		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Shuo Zhang			
Test Date:	02/01/2019			
Remarks:	RFID and BLE radio transmit simultaneously			







Frequency MHz	Raw dBμV/m	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
7206.35	40.33	5.15	-0.45	45.03	Peak Max	H	116	209	74	-28.98	Pass
9607.87	41.47	5.6	0.51	47.58	Peak Max	V	100	79	74	-26.42	Pass
4803.83	41.35	4.1	-0.93	44.52	Peak Max	V	109	174	74	-29.48	Pass
7206.35	28.28	5.15	-0.45	32.97	Average Max	H	116	209	54	-21.03	Pass
9607.87	28.23	5.6	0.51	34.34	Average Max	V	100	79	54	-19.66	Pass
4803.83	28.53	4.1	-0.93	31.71	Average Max	H	185	305	54	-22.3	Pass

## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
<b>Radiated Emissions</b>						
Spectrum Analyzer	N9010A	10SL0219	05/13/2018	1 Year	05/13/2019	<input checked="" type="checkbox"/>
Bi-Log antenna (30MHz~1GHz)	JB1	A030702	03/09/2018	1 Year	03/09/2019	<input checked="" type="checkbox"/>
Horn Antenna (1GHz~18GHz)	3115	100059	11/09/2018	1 Year	11/09/2019	<input checked="" type="checkbox"/>
Horn Antenna (18GHz~40GHz)	PA-840	181251	06/23/2018	1 Year	06/23/2019	<input checked="" type="checkbox"/>
Preamplifier (100KHz-7GHz)	LPA-6-30	11170602	03/09/2018	1 Year	03/09/2019	<input checked="" type="checkbox"/>
Preamplifier (0.01-50 GHz)	RAMP00M50GA	17032300047	02/19/2018	1 Year	02/19/2019	<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		<a href="#">A1</a> , <a href="#">A2</a> , <a href="#">A3</a> , <a href="#">A4</a> , <a href="#">B1</a> , <a href="#">B2</a> , <a href="#">B3</a> , <a href="#">B4</a> , 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 Equipment: EN45011:</b> EN ISO/IEC 17065
		<b>Electromagnetic Compatibility:</b> EN45011 – EN ISO/IEC 17065
Singapore iDA CB(Certification Body)		<a href="#">Phase I</a> , <a href="#">Phase II</a>
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		<b>(Phase II)</b> OFCA Foreign Certification Body for Radio and Telecom
		<b>(Phase I)</b> 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>Radiocommunications:</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