# RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC_RF_SL18021402-CRT-005-2.4GHz
Supersede Report No.: None

| | | |
|---|---|---|
| Applicant | : | CURRUNT, INC. (PALO ALTO) |
| Product Name | : | SMART OUTLET |
| Model No. | : | WALL02 |
| Test Standard | : | 47 CFR 15.247 |
| Test Method | : | ANSI C63.10: 2013<br>558074 D01 DTS Meas Guidance v04 |
| FCC ID | : | 2ALKS-WALL02 |
| Dates of test | : | 05/02/2018-05/22/2018 |
| Issue Date | : | 05/22/2018 |
| Test Result | : | ☒ Pass ☐ Fail |
| Equipment complied with the specification [X]<br>Equipment did not comply with the specification [ ] | | |

| This Test Report is Issued Under the Authority of: | |
|---|---|
| | |
| Vijay Chaudhary | Chen Ge |
| RF Test Engineer | Engineer Reviewer |

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

ilac-MRA
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 Directive |
| Japan | MIC (RCB 208) | RF, Telecom |
| Hong Kong | OFTA (US002) | RF, Telecom |

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# 1 Report Revision History

| Report No. | Report Version | Description | Issue Date |
|---|---|---|---|
| FCC_RF_SL18021402-CRT-005-2.4GHz | None | Original | 05/22/2018 |
| | | | |
| | | | |
| | | | |

## 2 Executive Summary

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

Company: CURRANT, INC (PALO ALTO)
Product: SMART OUTLET
Model: WALL02

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 | CURRENT, INC (PALO ALTO) |
| Applicant Address | 195 Page Mill Road, Suite # 111, Palo Alto, CA - 94306, USA |
| Manufacturer Name | CURRENT, INC (PALO ALTO) |
| Manufacturer Address | 195 Page Mill Road, Suite # 111, Palo Alto, CA - 94306, USA |

## 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 | SMART OUTLET |
| Model No. | WALL02 |
| Trade Name | CURRENT |
| Serial No. | N/A |
| Input Power | 120V 60Hz |
| Power Adapter Manu/Model | N/A |
| Power Adapter SN | N/A |
| Date of EUT received | 05/02/2018 |
| Equipment Class/ Category | DTS |
| Remark | None |

## 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 | Omni Antenna | | |
| Antenna Gain (Peak) | 3 dBi | | |
| Antenna Connector Type | Integrated on PCB | | |

# 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 | Laptop | USB | EUT | Connection | 1 | Unshielded | - |
| - | - | - | - | - | - | - | - |

## 7.3 Test Software Description

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

# 8 Test Summary

| Test Item | Test standard | | Test Method/Procedure | | Pass / Fail |
|---|---|---|---|---|---|
| Antenna Requirement | FCC | 15.203 | FCC | ANSI C63.10-2013<br>558074 D01 DTS Meas. Guidance v03r02 | ☐ Pass<br>☒ N/A |
| AC Conducted Emissions Voltage | FCC | 15.207(a) | FCC | ANSI C63.10: 2013 | ☐ Pass<br>☒ N/A |

DSS Band Requirement

| Test Item | Test standard | | Test Method/Procedure | | Pass / Fail |
|---|---|---|---|---|---|
| Channel Separation | FCC | 15.247 (a)(1) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| 20dB Occupied Bandwidth | FCC | 15.247(a)(1) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| 99% Occupied Bandwidth | FCC | 15.247(a)(2) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| Number of Hopping Channels | FCC | 15.247(a)(1) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| Radiated Spurious Emissions | FCC | 15.247(d) | FCC | Public Notice DA 00-705 | ☒ Pass<br>☐ N/A |
| Time of Occupancy | FCC | 15.247(a)(1) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| Output Power | FCC | 15.247(b) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| Antenna Gain > 6 dBi | FCC | 15.247(e) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| Power Spectral Density | FCC | 15.247(e) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| Hybrid System Requirement | FCC | 15.247(f) | FCC | Public Notice DA 00-705 | ☐ Pass<br>☒ N/A |
| Hopping Capability | FCC | 15.247(g) | FCC | Public Notice DA 00-705 | ☐ Pass<br>☒ N/A |
| RF Exposure requirement | FCC | 15.247(i) | FCC | Public Notice DA 00-705 | ☒ * Pass<br>☐ N/A |
| Remark | 1. All measurement uncertainties are not taken into consideration for all presented test result.<br>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.<br>3. Please refer original report No: SZEM160300176101 for *Pass. Only radiated emission tested for this device | | | | |

# 9 Measurement Uncertainty

## 9.1 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.

## 9.2 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

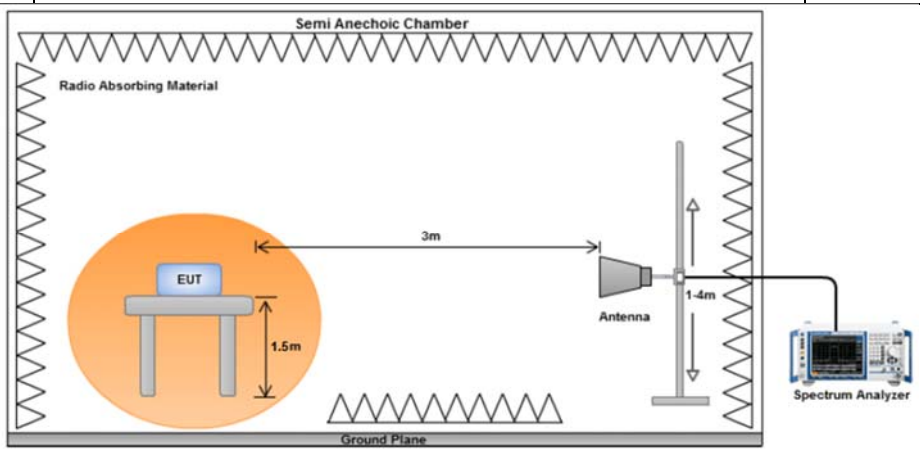
| Source of Uncertainty | Value (dB) | Probability Distribution | Division | Sensitivity Coefficient | Expanded Uncertainty |
|---|---|---|---|---|---|
| Reference Level | 0.12 | Rectangular | 1.732 | 1 | 0.069284 |
| Cable Insertion Loss | 0.21 | Normal | 2 | 1 | 0.105 |
| Attenuator | 0.25 | Normal | 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 Radiated Spurious Emissions in Restricted band

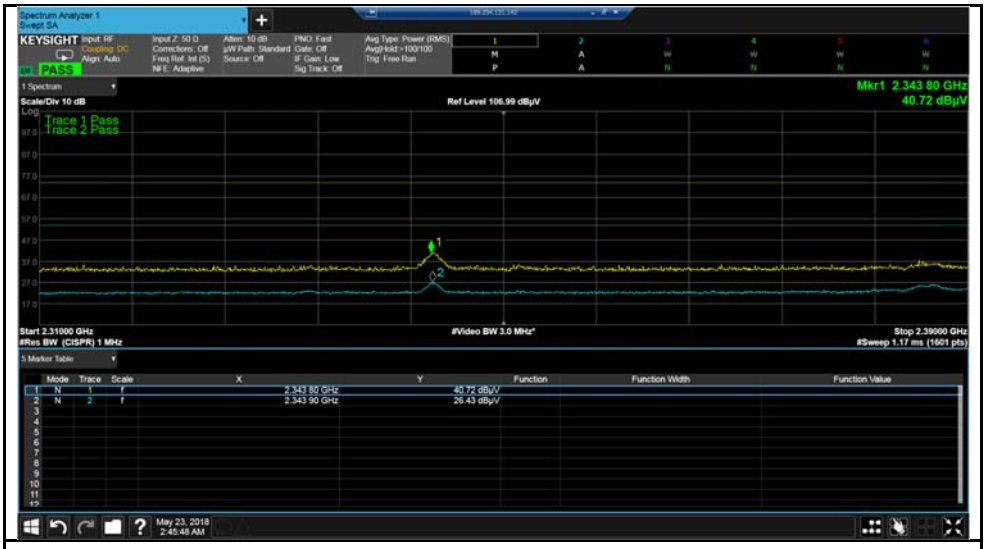
Requirement(s):

| 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<br>☐ 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.<br>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:<br>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.<br>b. The EUT was then rotated to the direction that gave the maximum emission.<br>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.<br>3. An average measurement was then made for that frequency point.<br>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. Radiated measurement was measured with antenna port terminated, there isn't outstanding emission found at the edge of restricted frequency, within x dB margin | | |
| Result | ☒ Pass ☐ Fail | | |

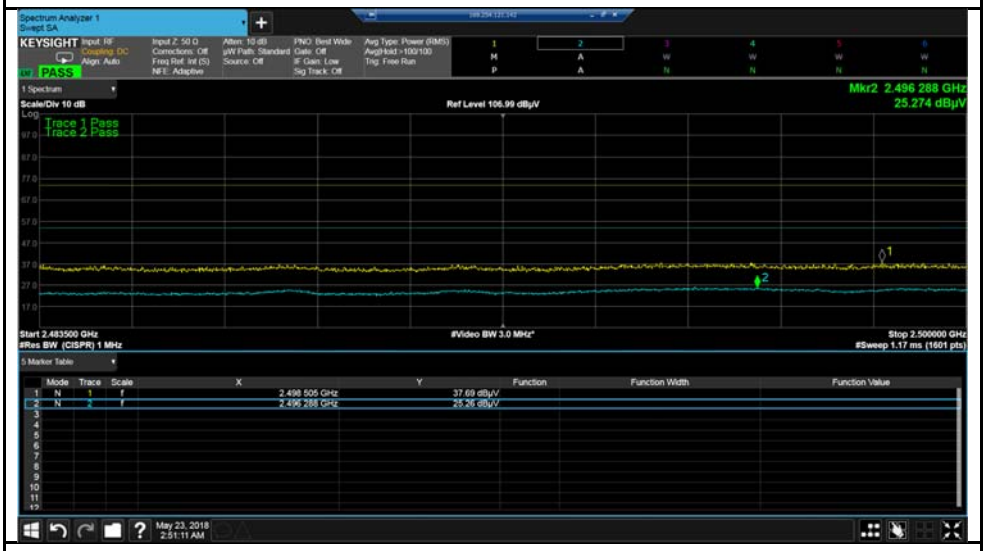
Test Data ☐ Yes (See below) ☒ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Vijay Chaudhary at 10m chamber.

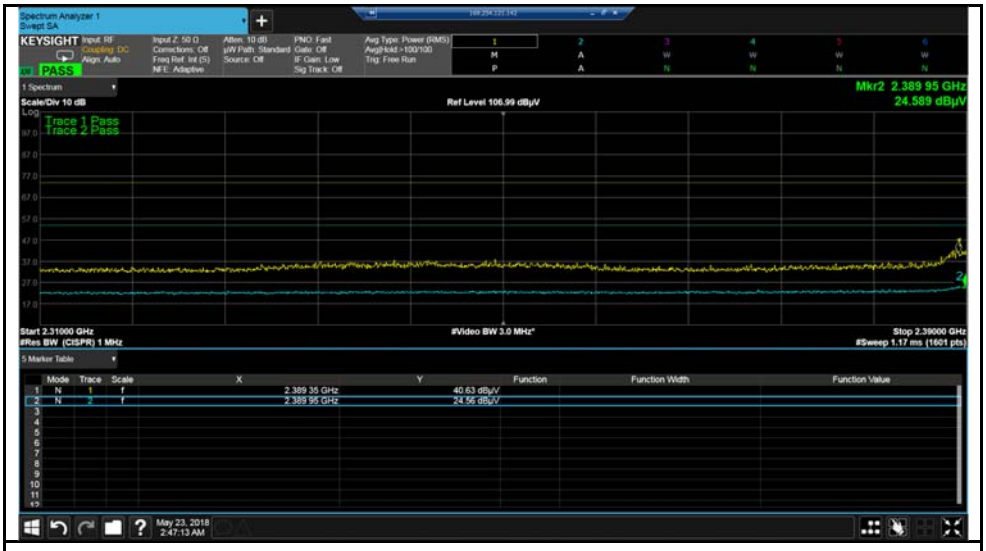
Restricted Band Measurement Plots:



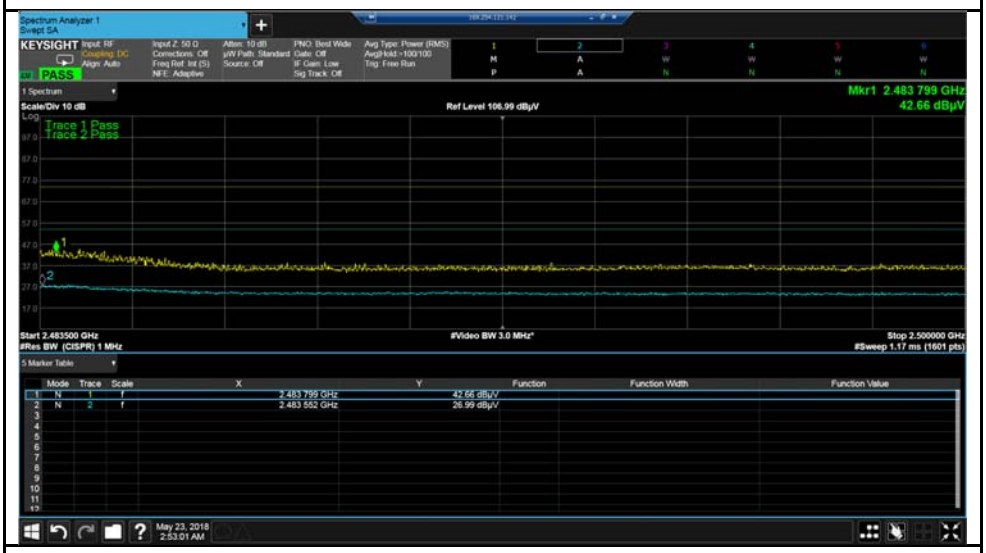

2.4GHz-11B-2412 MHz



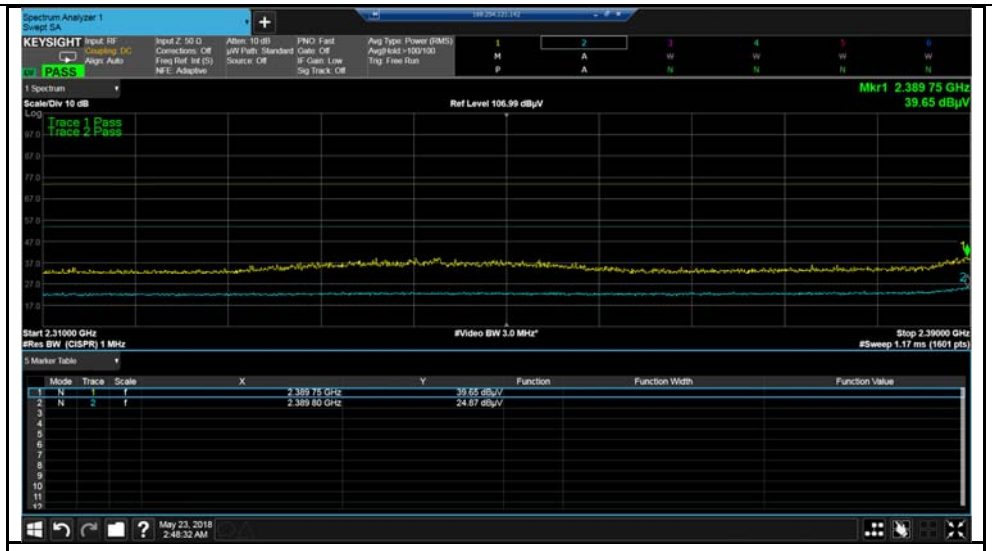

2.4GHz-11B-2462 MHz



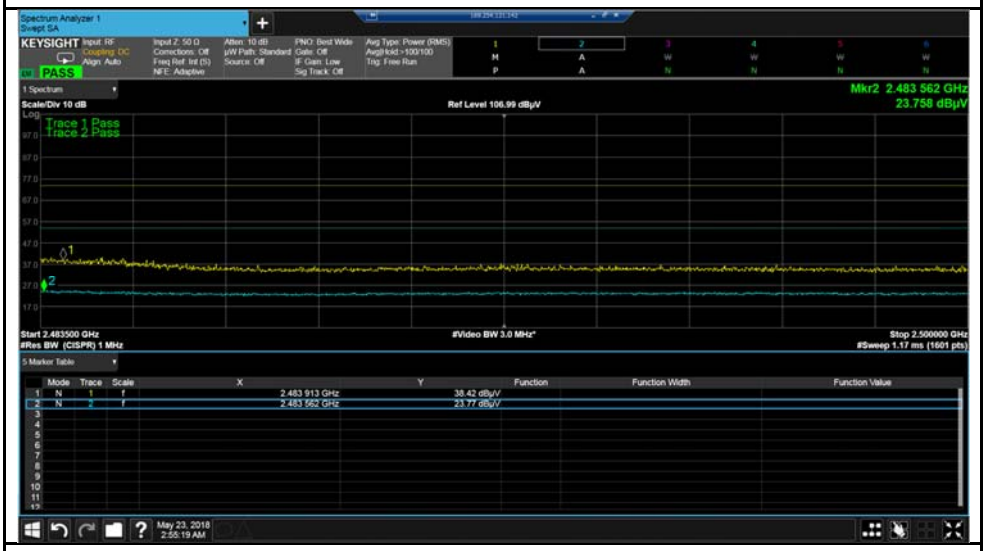

2.4GHz-11G-2412 MHz




2.4GHz-11G-2462 MHz



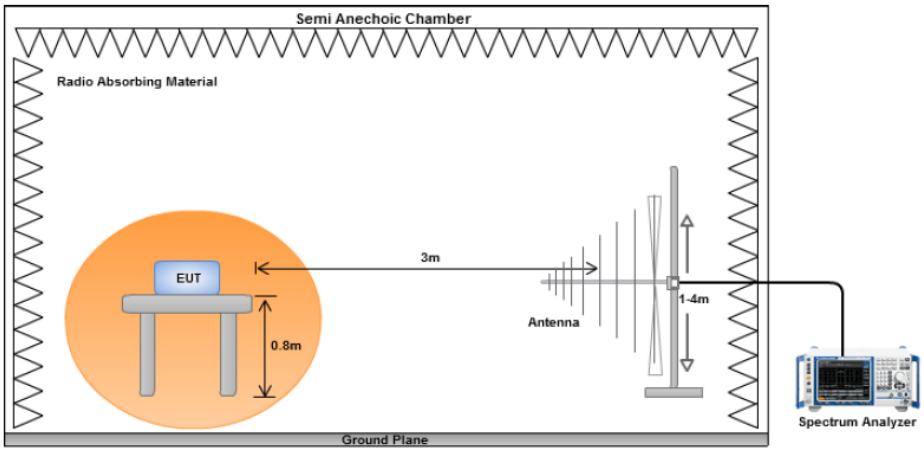

2.4GHz-11N20-2412 MHz




2.4GHz-11N20-2462 MHz

## 10.2 Radiated Spurious Emissions Below 1GHz

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.247(d)</td><td>a)</td><td>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></td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 
</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT was switched on and allowed to warm up to its normal operating condition.<br>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:<br>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.<br>b. The EUT was then rotated to the direction that gave the maximum emission.<br>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.<br>3. A Quasi-peak measurement was then made for that frequency point.<br>4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</td></tr>
<tr><td>Remark</td><td colspan="3">The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.</td></tr>
<tr><td>Result</td><td colspan="3">☒ Pass ☐ Fail</td></tr>
</table>

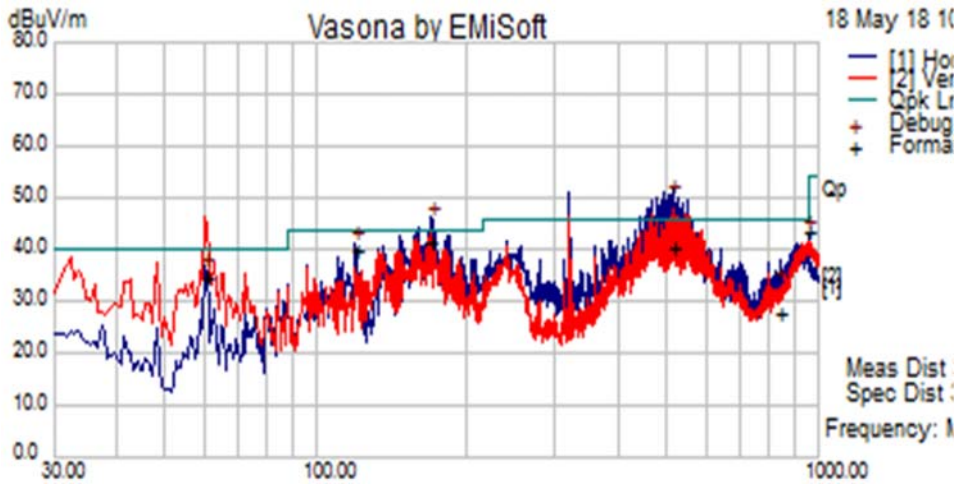
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Vijay Chaudhary at 10m chamber.

## Radiated Emission Test Results (Below 1GHz)

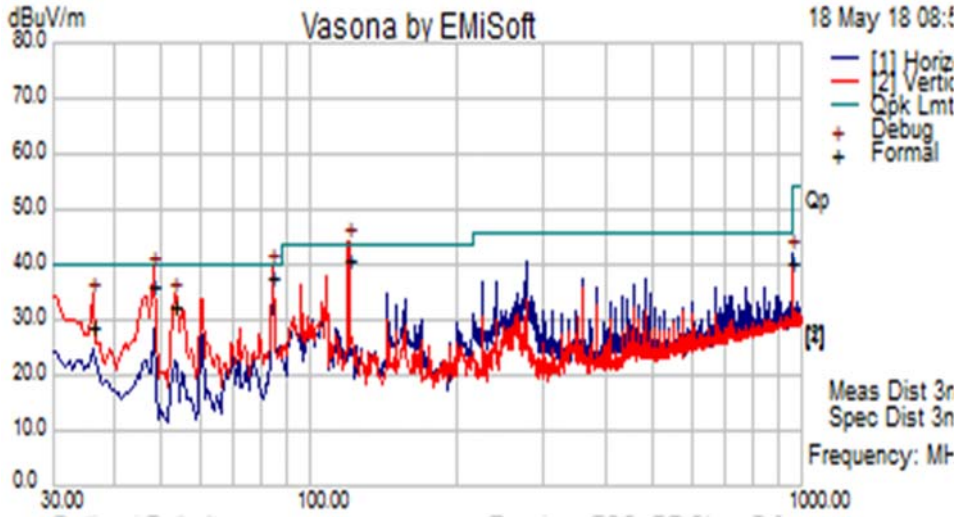
| Test specification | Below 1GHz | | | |
|---|---|---|---|---|
| Environmental Conditions: | Temp (°C): | 26.1 | Result | Pass |
| | Humidity (%) | 47.5 | | |
| | Atmospheric (mbar): | 1020 | | |
| Mains Power: | 120VAC, 60Hz | | | |
| Tested by: | Vijay Chaudhary | | | |
| Test Date: | 05/18/2018 | | | |
| Remarks: | 11B-2437 MHz | | | |




| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 514.48 | 44.20 | 14.33 | -18.32 | 40.21 | Quasi Max | H | 163 | 147 | 46 | -5.80 | Pass |
| 169.22 | 53.00 | 12.35 | -24.06 | 41.28 | Quasi Max | H | 204 | 293 | 43.5 | -2.22 | Pass |
| 119.99 | 50.53 | 12.07 | -22.87 | 39.73 | Quasi Max | H | 261 | 155 | 43.5 | -3.77 | Pass |
| 960.06 | 40.88 | 16.08 | -13.55 | 43.40 | Quasi Max | H | 149 | 179 | 54 | -10.60 | Pass |
| 60.00 | 50.82 | 11.51 | -27.74 | 34.58 | Quasi Max | H | 275 | 311 | 40 | -5.42 | Pass |
| 839.38 | 25.73 | 15.61 | -13.66 | 27.68 | Quasi Max | H | 100 | 177 | 46 | -18.32 | Pass |

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

| | | | | |
|---|---|---|---|---|
| Test specification | Below 1GHz | | | |
| Environmental Conditions: | Temp (°C): | 26.1 | Result | Pass |
| | Humidity (%) | 47.5 | | |
| | Atmospheric (mbar): | 1020 | | |
| Mains Power: | 120VAC, 60Hz | | | |
| Tested by: | Vijay Chaudhary | | | |
| Test Date: | 05/18/2018 | | | |
| Remarks: | Co-Location (BLE & 2.4GHz) | | | |

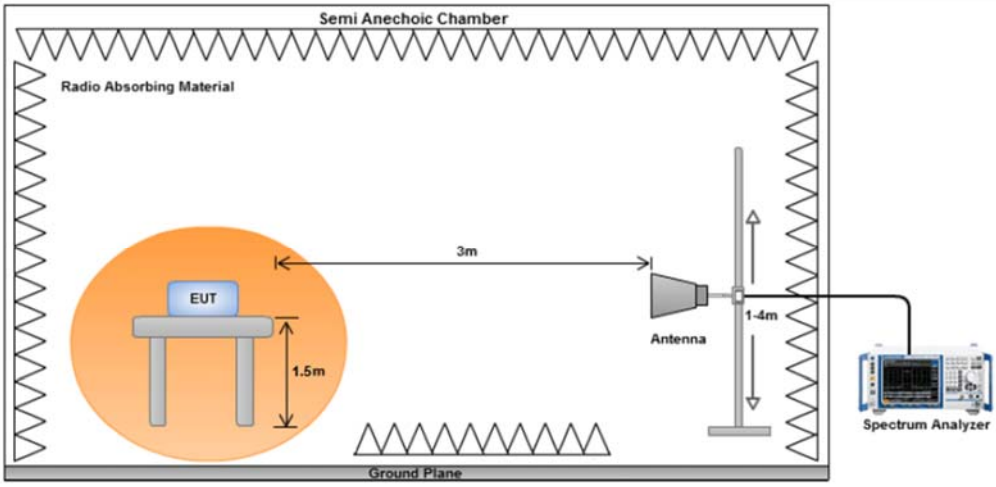



| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 119.97 | 51.81 | 12.07 | -22.87 | 41.01 | Quasi Max | V | 110 | 208 | 43.5 | -2.49 | Pass |
| 83.98 | 54.34 | 11.72 | -28.02 | 38.04 | Quasi Max | V | 109 | 159 | 40 | -1.96 | Pass |
| 47.98 | 50.70 | 11.43 | -26.15 | 35.99 | Quasi Max | V | 132 | 247 | 40 | -4.02 | Pass |
| 960.04 | 38.11 | 16.08 | -13.55 | 40.64 | Quasi Max | H | 100 | 20 | 54 | -13.36 | Pass |
| 35.97 | 35.89 | 11.22 | -18.17 | 28.93 | Quasi Max | V | 140 | 322 | 40 | -11.07 | Pass |
| 52.98 | 48.30 | 11.46 | -27.4 | 32.37 | Quasi Max | V | 107 | 81 | 40 | -7.63 | 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) | 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<br>☐ 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.<br>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:<br>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.<br>b. The EUT was then rotated to the direction that gave the maximum emission.<br>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.<br>3. An average measurement was then made for that frequency point.<br>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 Vijay Chaudhary at 10m chamber.

## Radiated Emission Test Results (Above 1GHz)

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7208.40 | 42.58 | 5.15 | -0.45 | 47.28 | Peak Max | V | 127 | 123 | 74 | -26.72 | Pass |
| 4805.50 | 41.22 | 4.11 | -0.93 | 44.39 | Peak Max | V | 194 | 130 | 74 | -29.61 | Pass |
| 2009.98 | 41.72 | 2.74 | -2.47 | 41.99 | Peak Max | V | 101 | 270 | 74 | -32.01 | Pass |
| 7208.40 | 31.01 | 5.15 | -0.45 | 35.70 | Average Max | V | 127 | 123 | 54 | -18.30 | Pass |
| 4805.50 | 29.95 | 4.11 | -0.93 | 33.13 | Average Max | V | 194 | 130 | 54 | -20.87 | Pass |
| 2009.98 | 28.72 | 2.74 | -2.47 | 28.99 | Average Max | V | 101 | 270 | 54 | -25.01 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7311.35 | 53.11 | 5.15 | -0.49 | 57.78 | Peak Max | V | 147 | 91 | 74 | -16.22 | Pass |
| 4873.00 | 46.33 | 4.17 | -0.98 | 49.52 | Peak Max | V | 160 | 130 | 74 | -24.48 | Pass |
| 1652.72 | 41.34 | 2.49 | -5.53 | 38.3 | Peak Max | V | 141 | 232 | 74 | -35.70 | Pass |
| 7311.35 | 46.33 | 5.15 | -0.49 | 51 | Average Max | V | 147 | 91 | 54 | -3.00 | Pass |
| 4873.00 | 38.95 | 4.17 | -0.98 | 42.14 | Average Max | V | 160 | 130 | 54 | -11.86 | Pass |
| 1652.72 | 28.40 | 2.49 | -5.53 | 25.36 | Average Max | V | 141 | 232 | 54 | -28.64 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1925.18 | 41.42 | 2.69 | -2.70 | 41.42 | Peak Max | V | 213 | 208 | 74 | -32.58 | Pass |
| 7986.91 | 38.89 | 5.42 | -0.67 | 43.64 | Peak Max | V | 101 | 339 | 74 | -30.37 | Pass |
| 5526.43 | 39.32 | 4.47 | -1.01 | 42.79 | Peak Max | V | 101 | 3 | 74 | -31.21 | Pass |
| 1925.18 | 28.94 | 2.69 | -2.70 | 28.94 | Average Max | V | 213 | 208 | 54 | -25.06 | Pass |
| 7986.91 | 26.57 | 5.42 | -0.67 | 31.31 | Average Max | V | 101 | 339 | 54 | -22.69 | Pass |
| 5526.43 | 26.02 | 4.47 | -1.01 | 29.49 | Average Max | V | 101 | 3 | 54 | -24.51 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7236.70 | 61.56 | 5.16 | -0.46 | 66.25 | Peak Max | V | 187 | 254 | 74 | -7.75 | Pass |
| 4823.44 | 53.80 | 4.12 | -0.93 | 56.99 | Peak Max | V | 147 | 142 | 74 | -17.01 | Pass |
| 2284.29 | 39.08 | 2.91 | -3.55 | 38.44 | Peak Max | V | 342 | 184 | 74 | -35.56 | Pass |
| 7236.70 | 48.30 | 5.16 | -0.46 | 52.99 | Average Max | V | 187 | 254 | 54 | -1.01 | Pass |
| 4823.44 | 39.78 | 4.12 | -0.93 | 42.97 | Average Max | V | 147 | 142 | 54 | -11.03 | Pass |
| 2284.29 | 26.71 | 2.91 | -3.55 | 26.07 | Average Max | V | 342 | 184 | 54 | -27.93 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4873.85 | 53.84 | 4.17 | -0.98 | 57.03 | Peak Max | V | 141 | 114 | 74 | -16.97 | Pass |
| 7311.80 | 61.48 | 5.15 | -0.49 | 66.15 | Peak Max | V | 171 | 134 | 74 | -7.85 | Pass |
| 2056.33 | 40.83 | 2.77 | -2.94 | 40.66 | Peak Max | V | 156 | 67 | 74 | -33.34 | Pass |
| 4873.85 | 39.37 | 4.17 | -0.98 | 42.55 | Average Max | V | 141 | 114 | 54 | -11.45 | Pass |
| 7311.80 | 48.40 | 5.15 | -0.49 | 53.06 | Average Max | V | 171 | 134 | 54 | -0.94 | Pass |
| 2056.33 | 28.58 | 2.77 | -2.94 | 28.41 | Average Max | V | 156 | 67 | 54 | -25.59 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7386.48 | 60.26 | 5.14 | -0.51 | 64.9 | Peak Max | V | 203 | 258 | 74 | -9.11 | Pass |
| 4922.97 | 55.49 | 4.22 | -1.04 | 58.66 | Peak Max | V | 104 | 112 | 74 | -15.34 | Pass |
| 1901.16 | 39.88 | 2.68 | -2.61 | 39.94 | Peak Max | V | 118 | 343 | 74 | -34.06 | Pass |
| 7386.48 | 47.39 | 5.14 | -0.51 | 52.02 | Average Max | V | 203 | 258 | 54 | -1.98 | Pass |
| 4922.97 | 41.44 | 4.22 | -1.04 | 44.61 | Average Max | V | 104 | 112 | 54 | -9.39 | Pass |
| 1901.16 | 27.71 | 2.68 | -2.61 | 27.78 | Average Max | V | 118 | 343 | 54 | -26.22 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7237.33 | 61.53 | 5.16 | -0.46 | 66.22 | Peak Max | V | 142 | 191 | 74 | -7.78 | Pass |
| 4824.33 | 50.51 | 4.12 | -0.93 | 53.70 | Peak Max | V | 237 | 113 | 74 | -20.3 | Pass |
| 2240.39 | 40.61 | 2.89 | -3.58 | 39.92 | Peak Max | V | 332 | 196 | 74 | -34.08 | Pass |
| 7237.33 | 48.78 | 5.16 | -0.46 | 53.47 | Average Max | V | 142 | 191 | 54 | -0.53 | Pass |
| 4824.33 | 36.26 | 4.12 | -0.93 | 39.45 | Average Max | V | 237 | 113 | 54 | -14.55 | Pass |
| 2240.39 | 28.29 | 2.89 | -3.58 | 27.60 | Average Max | V | 332 | 196 | 54 | -26.40 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4874.56 | 49.93 | 4.17 | -0.98 | 53.12 | Peak Max | V | 263 | 96 | 74 | -20.89 | Pass |
| 7311.63 | 60.92 | 5.15 | -0.49 | 65.58 | Peak Max | V | 115 | 99 | 74 | -8.42 | Pass |
| 2115.99 | 40.96 | 2.81 | -3.02 | 40.75 | Peak Max | V | 171 | 231 | 74 | -33.25 | Pass |
| 4874.56 | 36.97 | 4.17 | -0.98 | 40.15 | Average Max | V | 263 | 96 | 54 | -13.85 | Pass |
| 7311.63 | 48.94 | 5.15 | -0.49 | 53.61 | Average Max | V | 115 | 99 | 54 | -0.39 | Pass |
| 2115.99 | 28.09 | 2.81 | -3.02 | 27.89 | Average Max | V | 171 | 231 | 54 | -26.11 | Pass |

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7387.39 | 59.62 | 5.14 | -0.51 | 64.25 | Peak Max | V | 133 | 147 | 74 | -9.75 | Pass |
| 4923.46 | 54.66 | 4.22 | -1.04 | 57.84 | Peak Max | V | 139 | 152 | 74 | -16.16 | Pass |
| 1889.96 | 40.60 | 2.67 | -2.73 | 40.54 | Peak Max | V | 309 | 326 | 74 | -33.47 | Pass |
| 7387.39 | 46.73 | 5.14 | -0.51 | 51.37 | Average Max | V | 133 | 147 | 54 | -2.64 | Pass |
| 4923.46 | 40.60 | 4.22 | -1.04 | 43.77 | Average Max | V | 139 | 152 | 54 | -10.23 | Pass |
| 1889.96 | 27.55 | 2.67 | -2.73 | 27.48 | Average Max | V | 309 | 326 | 54 | -26.52 | Pass |

Co-Location (BLE-2.4GHz)

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7322.20 | 38.81 | 5.15 | -0.49 | 43.47 | Peak Max | V | 108 | 194 | 74 | -30.53 | Pass |
| 9608.72 | 39.36 | 5.59 | 0.51 | 45.47 | Peak Max | V | 168 | 100 | 74 | -28.53 | Pass |
| 4803.87 | 45.16 | 4.10 | -0.93 | 48.34 | Peak Max | V | 351 | 238 | 74 | -25.66 | Pass |
| 7322.20 | 26.33 | 5.15 | -0.49 | 31.00 | Average Max | V | 108 | 194 | 54 | -23.01 | Pass |
| 9608.72 | 26.69 | 5.59 | 0.51 | 32.79 | Average Max | V | 168 | 100 | 54 | -21.21 | Pass |
| 4803.87 | 38.22 | 4.10 | -0.93 | 41.40 | Average Max | V | 351 | 238 | 54 | -12.60 | Pass |

# Annex A. TEST INSTRUMENT

| Instrument | Model | Serial # | Cal Date | Cal Cycle | Cal Due | In use |
|---|---|---|---|---|---|---|
| Radiated Emissions | | | | | | |
| Spectrum Analyzer | N9010B | 10SL0219 | 08/20/2017 | 1 Year | 08/20/2018 | ☑ |
| RF Preamplifier | LPA-6-30 | 11140711 | 07/21/2017 | 1 Year | 07/21/2018 | ☑ |
| Bi-Log antenna (30MHz~2GHz) | JB1 | A030702 | 08/12/2017 | 1 Year | 08/12/2018 | ☑ |
| Horn Antenna (1GHz~26GHz) | 3115 | 100059 | 08/25/2017 | 1 Year | 08/25/2018 | ☑ |
| Pre-Amp (1-40GHz) | SAS-474 | 579 | 08/04/2017 | 1 Year | 08/04/2018 | ☑ |
| RF Conducted Measurement | | | | | | |
| Spectrum Analyzer | N9010B | 10SL0219 | 08/20/2017 | 1 Year | 08/20/2018 | ☑ |

# 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:<br>EN ISO/IEC 17065 |
| | | Electromagnetic Compatibility:<br>EN45011 – EN ISO/IEC 17065 |
| Singapore iDA<br>CB(Certification Body) | | Phase I, Phase II |
| Vietnam MIC<br>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<br>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<br>KN22: Test Method for EMI<br>EMS: KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS<br>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<br>C-3421: Main Ports Conducted Interference Measurement<br>T-1597: Telecommunication Ports Conducted Interference Measuremet |
| Australia CAB Regocnition | | 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 |