

# RF TEST REPORT



**Report No.:** FCC-IC\_RF\_SL15081101-CPC-009-DSS\_Rev1.2  
**Supersede Report No.:** FCC-IC\_RF\_SL15081101-CPC-009-DSS\_Rev1.1

Applicant	:	ChargePoint, Inc
Product Name	:	Network Communication / RFID Reader
Model No.	:	28010077/ 28010087
Host Model no.	:	CPF12 & CPF25
Test Standard	:	47 CFR 15.247 RSS-247 Issue 1.0, May 2015
Test Method	:	ANSI C63.10: 2013 RSS-Gen Issue 4, Nov 2014 FCC Public Notice DA 00-705
FCC ID	:	W38-28010077/ W38-28010087
IC ID	:	8854A-28010077/ 8854A-28010087
Dates of test	:	August 28 <sup>th</sup> , September 16 <sup>th</sup> , 21 <sup>st</sup> - 23 <sup>rd</sup> of 2015
Issue Date	:	11/4/2015
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"/>		

This Test Report is Issued Under the Authority of:	
<b>Osvaldo Casorla</b>	<b>Chen Ge</b>
Test Engineer	Engineer Reviewer

**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/RRR, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

### Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE 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-IC_RF_SL15081101-CPC-009-DSS	None	Original	09/31/2015
FCC-IC_RF_SL15081101-CPC-009-DSS_Rev1.0	Rev 1.0	Updated EUT information.	10/01/2015
FCC-IC_RF_SL15081101-CPC-009-DSS_Rev1.1	Rev 1.1	Included enclosure photos	10/27/2015
FCC-IC_RF_SL15081101-CPC-009-DSS_Rev1.2	Rev 1.2	Updated page 25.	11/4/2015

## 2 Executive Summary

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

Company: ChargePoint, Inc.  
Product: Network Communication / RFID Reader  
Model: 28010077/ 28010087  
Host Model No. CPF12 & CPF25

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	ChargePoint, Inc.
Applicant Address	254 E. Hacienda Ave Campbell, CA 95148
Manufacturer Name	ChargePoint, Inc.
Manufacturer Address	254 E. Hacienda Ave Campbell, CA 95148

## 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	Network Communication / RFID Reader
Model No.	28010077/ 28010087
Serial No.	Prototype 1
Trade Name	ChargePoint, Inc.
Host Model No.	CPF12 & CPF25
Input Power	100-240VDC, 50/60Hz
Product Hardware version	28-010087
Product Software version	4.0.1.100
Radio Hardware version	28-010087
Radio Software version	4.0.1.100
Date of EUT received	08/21/2015
Equipment Class/ Category	DSS, DTS
Operating Frequencies	13.56MHz, 2402MHz-2480MHz
Port/Connectors	N/A

### 6.2 Radio Description

#### Specifications for Radio:

Radio Type	Bluetooth (Ver4.0+EDR)
Operating Frequency	2402MHz-2480MHz
Modulation	FHSS (BDR, EDR), DSSS (LE)
Channel Spacing	1MHz (BDR, EDR), 2MHz (LE)
Antenna Type	Presta Embedded Antenna
Antenna Gain	2.5dBi (for 2.4GHz)
Antenna Connector Type	On Board

Radio Type	RFID
Operating Frequency	13.56MHz
Modulation	ASK
Channel Spacing	None
Antenna Type	PCB loop antenna
Antenna Gain	0.5dBi
Antenna Connector Type	N/A

#### Channel List:

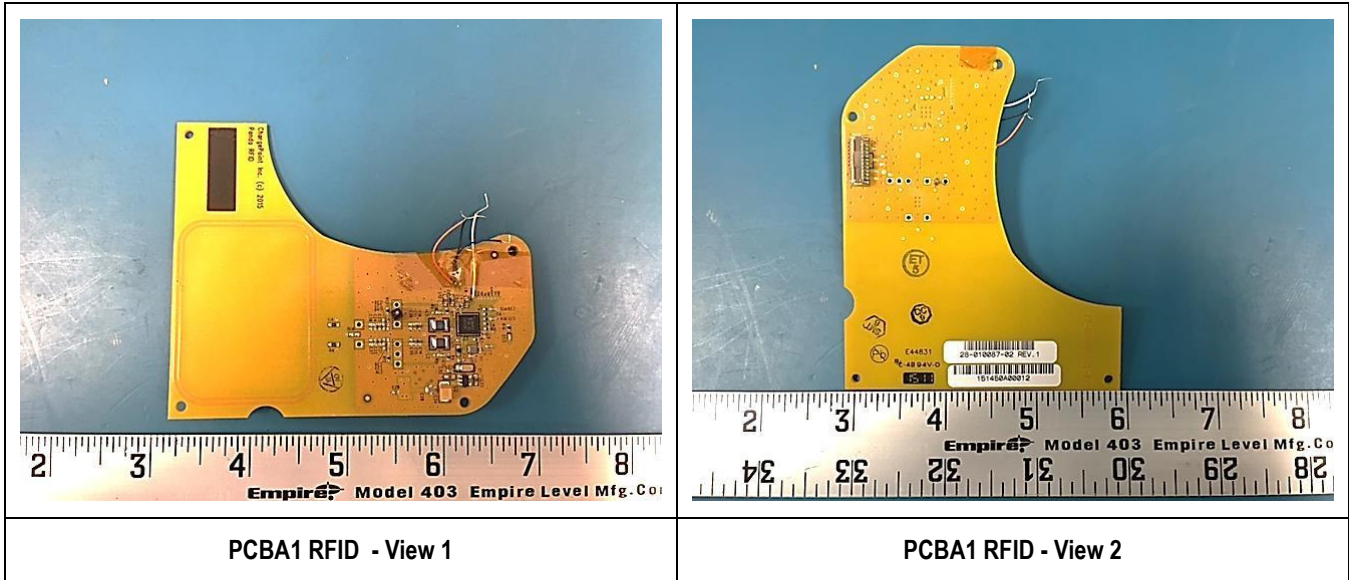
Type	Channel No.	Frequency (MHz)	Available (Y/N)
Bluetooth(BDR, EDR) 2402-2480MHz	0	2402	Y
	...	...	Y
	39	2441	Y
	...	...	Y
	78	2480	Y

Type	Mode	Channel No.	Frequency (MHz)	Available (Y/N)
RFID	13.56MHz	1	13.56	Y

### **6.3 EUT test modes/configuration Description**

Mode	Note
Bluetooth	BDR (GFSK)
Bluetooth	EDR (8-DPSK)
RF test	EUT is set to continuously transmit at 13.56MHz when powered on.

**6.4 EUT Photos**





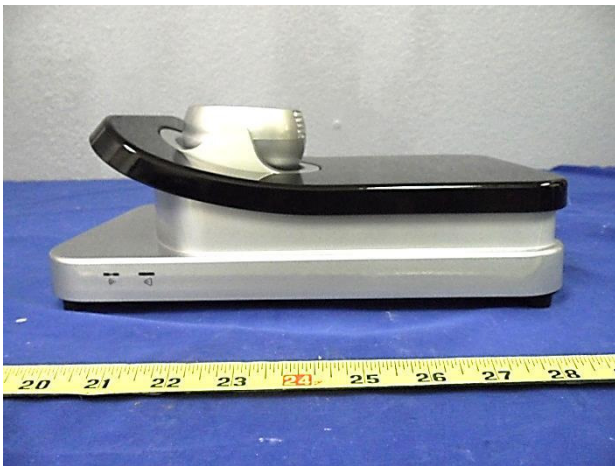
**6.5 Host External Photos**



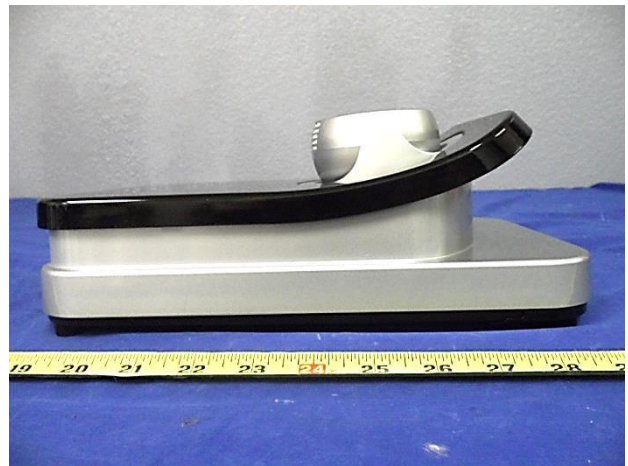
**EUT – Front View**



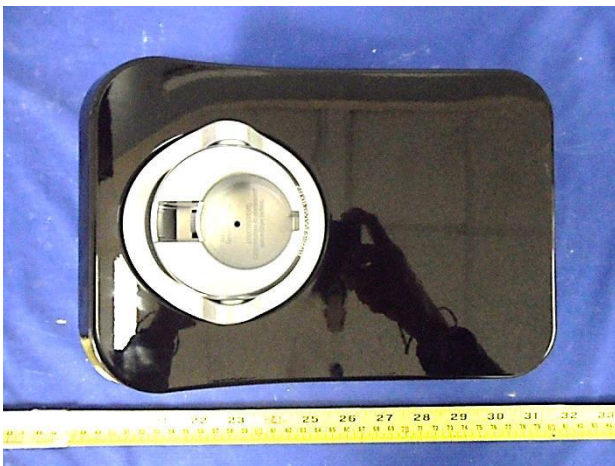
**EUT – Rear View**



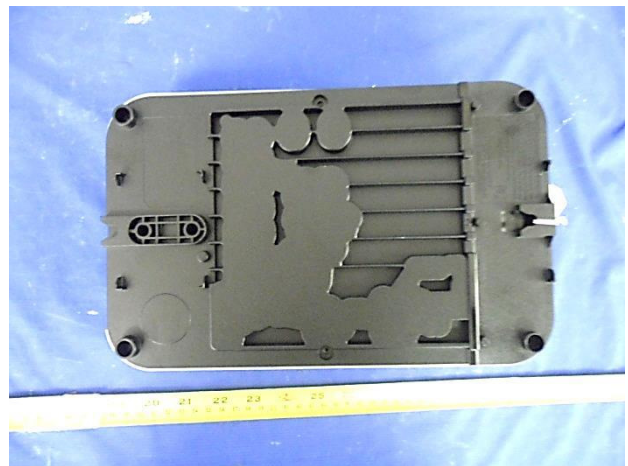
**EUT – Left View**



**EUT – Right View**



**EUT – Top View**



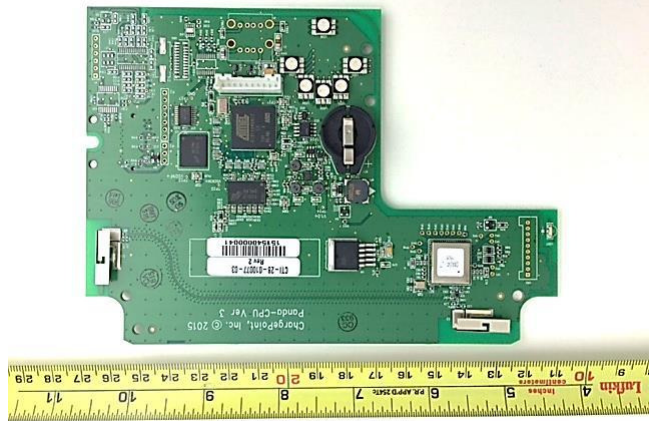
**EUT – Bottom View**



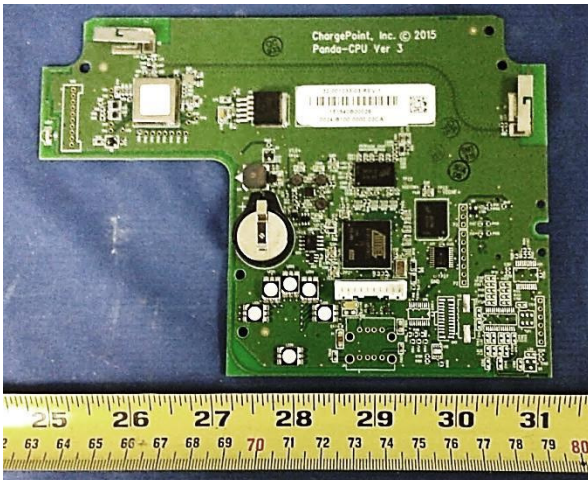
### 6.6 Host Internal Photos



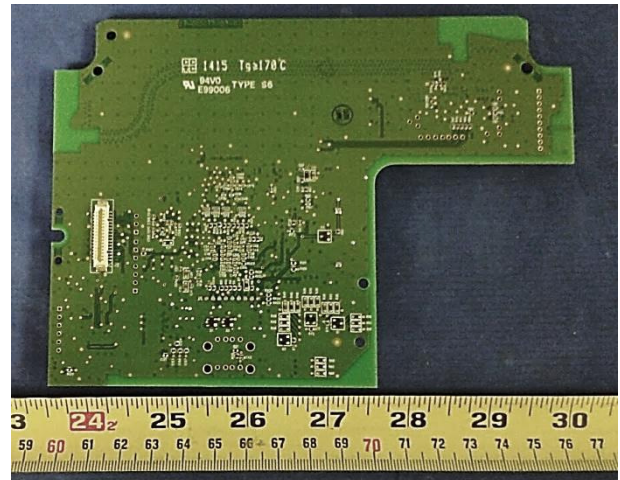
PCB Main Board- Top View



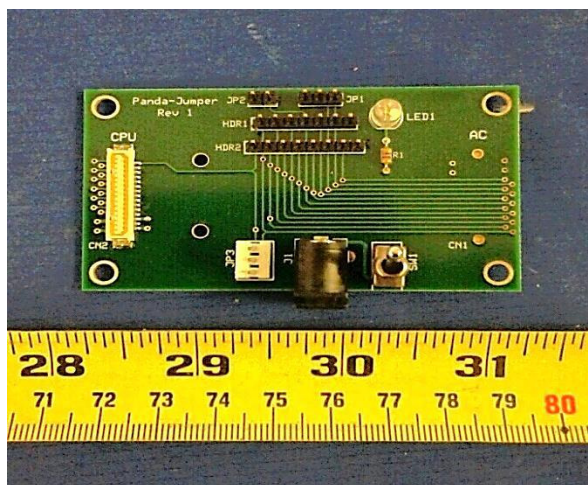
PCB Main Board- Bottom View



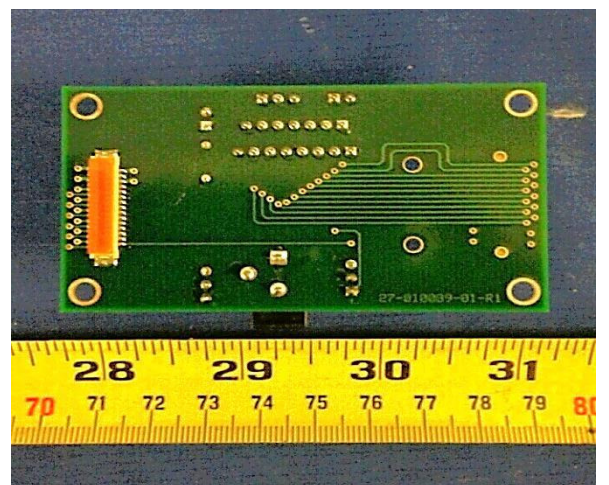
PCBA1 -Top View



PCBA1 -Bottom View

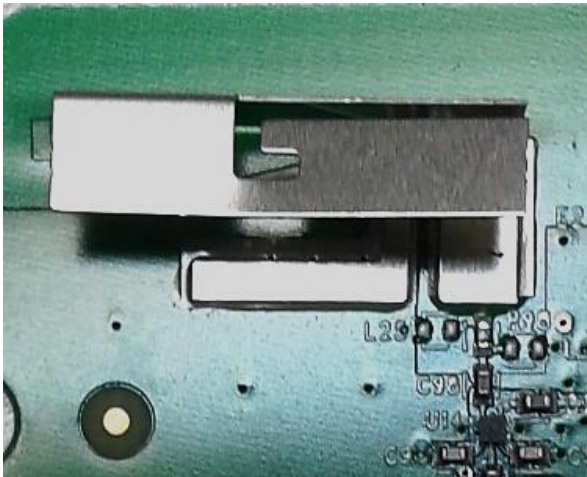


PCBA2 -Top View



PCBA2 -Bottom View





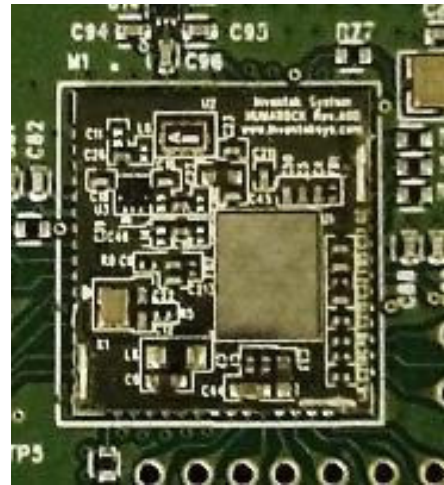
**Antenna 1**



**Antenna 2**



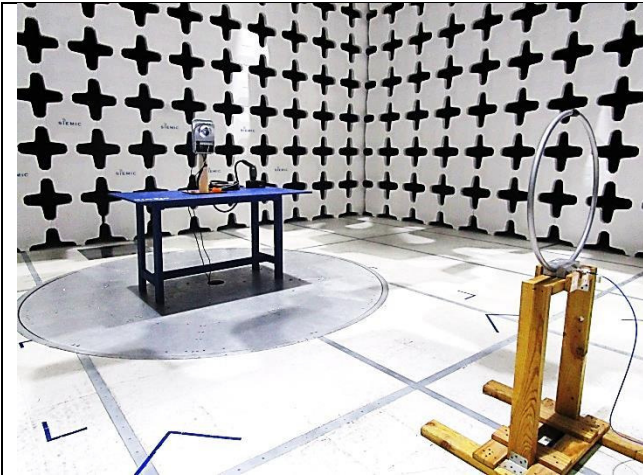
**EUT Radio with shielding**



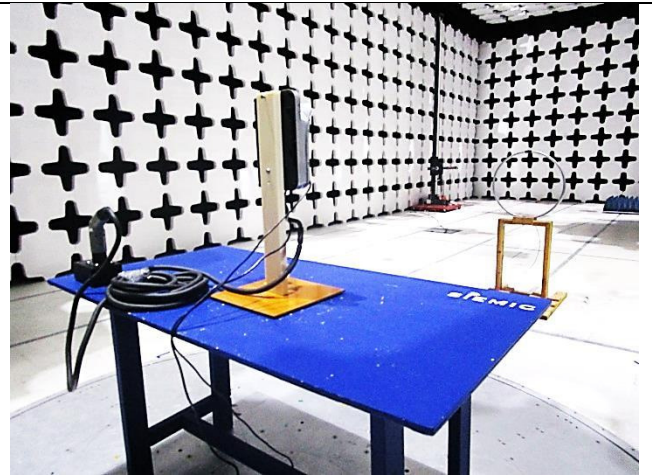
**EUT Radio without shielding**



**6.7 EUT Test Setup Photos**



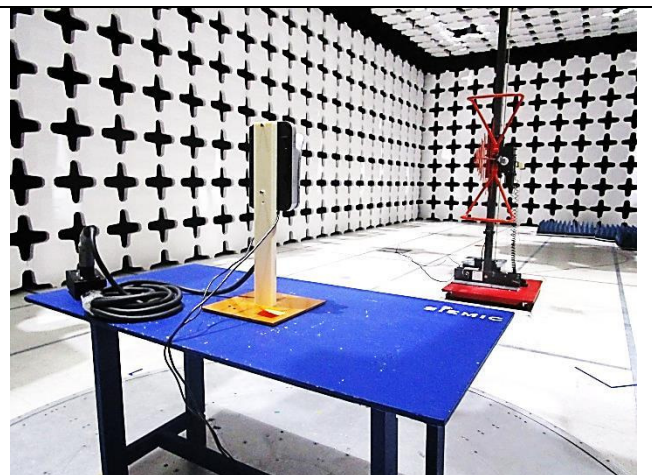
**Radiated Emissions (<30MHz) – Front View**



**Radiated Emissions (<30MHz) – Rear View**



**Radiated Emissions (<1GHz) – Front View**



**Radiated Emissions (<1GHz) – Rear View**



**Radiated Emissions (>1GHz) – Front View**



**Radiated Emissions (>1GHz) – Rear View**

## 7 Supporting Equipment/Software and cabling Description

### 7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	P05F Latitude E5510	N/A	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	EUT	I/O Port	Laptop	USB	1	Unshielded	-

### 7.3 Test Software Description

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

## 8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC	15.205	FCC	ANSI C63.10: 2013 Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS Gen 8.10		RSS Gen Issue 4: 2014	
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.10: 2013	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS Gen 8.8		RSS Gen Issue 4: 2014	

### 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	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS210 (A8.1)	IC	-	
20dB Occupied Bandwidth	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS Gen(6.6)	IC	-	
Bandwidth	FCC	15.247(a)(2)	FCC	Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS210 (A8.2)	IC	-	
Number of Hopping Channels	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS210(A8.1)	IC	-	
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	Public Notice DA 00-705	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS210(A8.5)	IC	-	
Time of Occupancy	FCC	15.247(a)(1)	FCC	Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS210(A8.1)	IC	-	
Output Power	FCC	15.247(b)	FCC	Public Notice DA 00-705	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS210 (A8.4)	IC	-	
Receiver Spurious Emissions	FCC	15.247(d)	FCC	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS Gen (7.1)	IC	RSS Gen (7.1)	
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS210(A8.4)	IC	-	
Power Spectral Density	FCC	15.247(e)	FCC	Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS210(A8.3)	IC	-	
RF Exposure requirement	FCC	15.247(i)	FCC	Public Notice DA 00-705	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
	IC	RSS Gen(3.2)	IC	-	
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> <li>Reference report FCC_RF_SL15060501-CPC-006-DSS for more information.</li> </ol>				

## 9 Measurement Uncertainty

Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and 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)	+5.6dB/-4.5dB
Band Edge and 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)	+4.3dB/-4.1dB



## 10 Measurements, Examination and Derived Results

### 10.1 Radiated Measurements

#### 10.1.1 Radiated Measurements below 30MHz

**Requirement(s):**

Specification(s)	Requirement	Applicable									
47 CFR §15.225 RSS-210 (A2.6)	<p>Operation within the band 13.110–14.010 MHz</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p>	<input checked="" type="checkbox"/>									
Test Setup	<ol style="list-style-type: none"> <li>The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.</li> <li>The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.</li> <li>The relevant loop antenna was set at the required test distance away from the EUT and supporting equipment boundary.</li> </ol>										
Procedure	<p>For &lt; 30MHz, Radiated emissions were measured according to ANSI C63.10. The EUT was set to transmit at the highest output power.</p> <p>The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the centre of the loop. The measuring bandwidth was set to 10 kHz.</p> <p>The limit is converted from microvolt/meter to decibel microvolt/meter.</p>										
Test Date	08/28/2015	<table border="0"> <tr> <td>Environmental conditions</td> <td>Temperature</td> <td>22°C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>40%</td> </tr> <tr> <td></td> <td>Atmospheric Pressure</td> <td>1026mbar</td> </tr> </table>	Environmental conditions	Temperature	22°C		Relative Humidity	40%		Atmospheric Pressure	1026mbar
Environmental conditions	Temperature	22°C									
	Relative Humidity	40%									
	Atmospheric Pressure	1026mbar									
Remark	EDR Mid channel 2441MHz										
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail										

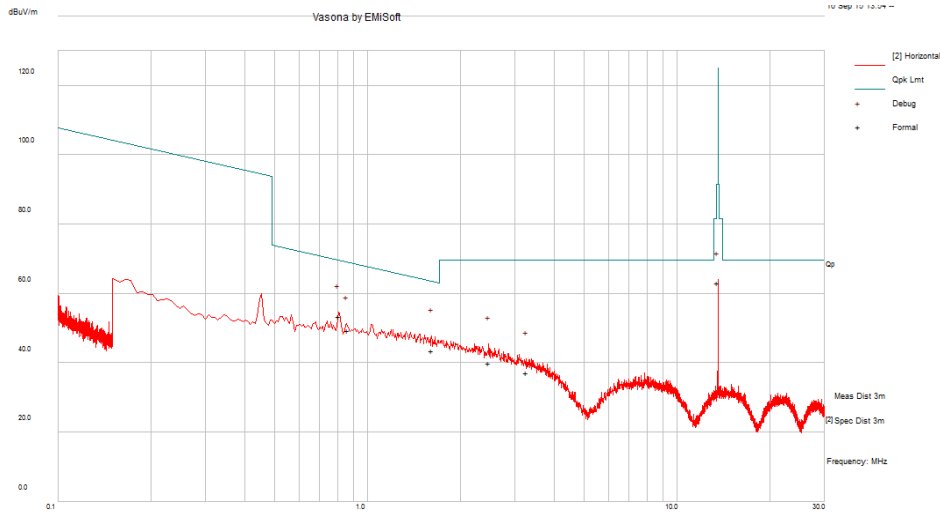
**Test Data**     Yes (See below)       N/A

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



**Test Plots for LMA Module/s and CPF12 & CPF25 below 30MHz**

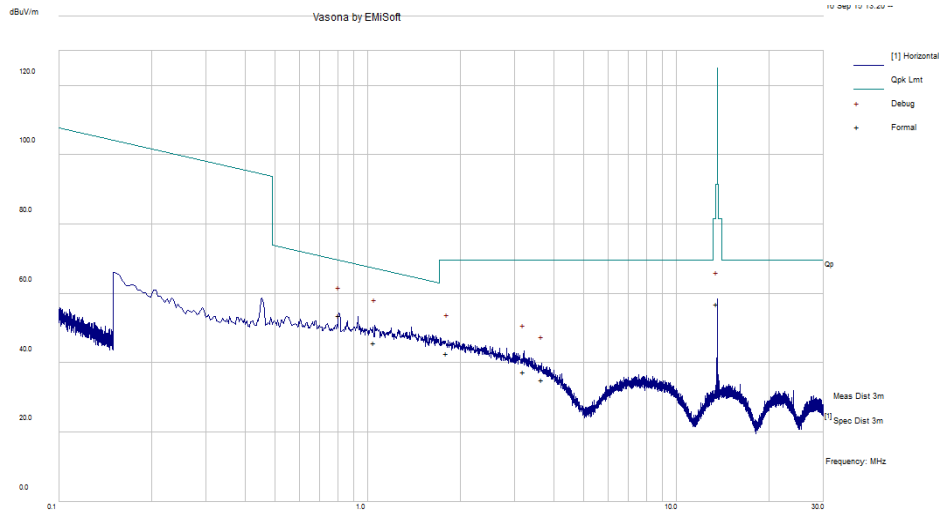
**f= 100kHz – 30MHz plot, and loop antenna at 0 degree at 3m distance**



**f= 100kHz – 30MHz Measurements**

Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Degree	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
0.81	39.23	-0.20	14.28	53.31	Quasi Max	0.00	100.00	341.00	69.43	-16.12	Pass
1.61	34.81	-0.25	8.99	43.55	Quasi Max	0.00	100.00	227.00	63.47	-19.92	Pass
0.86	35.72	-0.21	13.81	49.32	Quasi Max	0.00	100.00	45.00	68.89	-19.57	Pass
2.46	34.43	-0.30	5.90	40.03	Quasi Max	0.00	100.00	352.00	69.54	-29.52	Pass
3.27	33.39	-0.31	4.01	37.09	Quasi Max	0.00	100.00	127.00	69.54	-32.45	Pass
13.56	63.83	-0.62	-0.16	63.06	Quasi Max	0.00	100.00	6.00	123.99	-60.93	Pass

**f= 100kHz – 30MHz plot, and loop antenna at 90 degree at 3m distance**



**f= 100kHz – 30MHz Measurements**

Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Degree	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
0.81	39.54	-0.20	14.28	53.62	Quasi Max	90.00	100.00	275.00	69.43	-15.81	Pass
1.05	33.93	-0.22	12.21	45.93	Quasi Max	90.00	100.00	105.00	67.18	-21.25	Pass
1.81	34.81	-0.27	8.13	42.68	Quasi Max	90.00	100.00	250.00	69.54	-26.86	Pass
3.20	33.58	-0.31	4.14	37.41	Quasi Max	90.00	100.00	267.00	69.54	-32.13	Pass
3.66	32.16	-0.31	3.36	35.21	Quasi Max	90.00	100.00	36.00	69.54	-34.33	Pass
13.56	57.65	-0.62	-0.15	56.87	Quasi Max	90.00	100.00	279.00	123.99	-67.12	Pass

### 10.1.2 Transmitter Radiated Spurious Emissions Below 1GHz

**Requirement(s):**

Specification(s)	Item	Requirement	Applicable										
47CFR§15.247(d), RSS210(A8.5)	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													
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>A Quasi-peak 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 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.												
Result	☒ Pass      ☐ Fail												

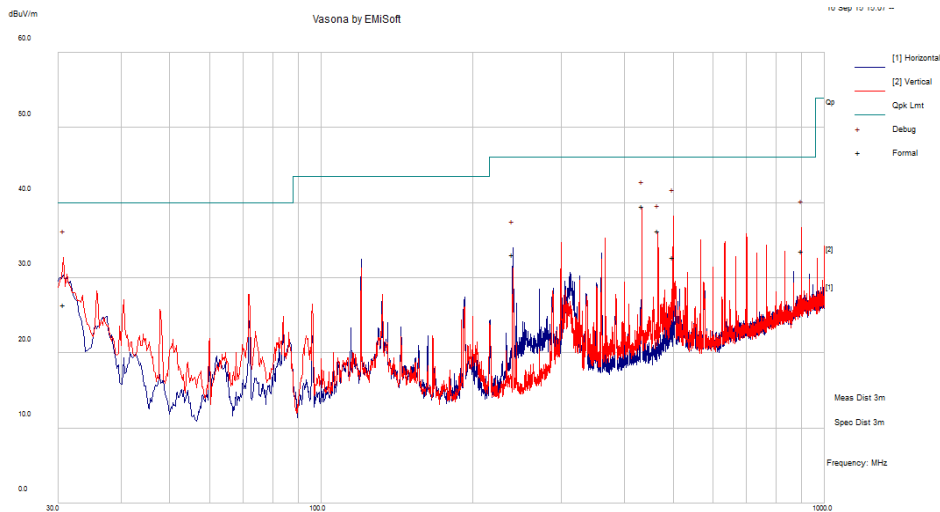
**Test Data**    ☒ Yes (See below)      ☐ N/A

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

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

Test specification:	Radiated Spurious Emissions			Result:	<input checked="" type="checkbox"/> Pass  <input type="checkbox"/> Fail
Environmental Conditions:	Temp(°C):	25.5 °C			
	Humidity (%):	44.4 %			
	Atmospheric(mbar):	1016 mbar			
Mains Power:	208V <sub>AC</sub> , 60Hz				
Tested by:	Osvaldo Casorla				
Test Date:	09/16/2015				
Remarks:	EDR Mid channel 2441MHz				

**f=30MHz – 1000MHz plot at V= 208V<sub>AC</sub>, 60Hz and 3 meter distance**



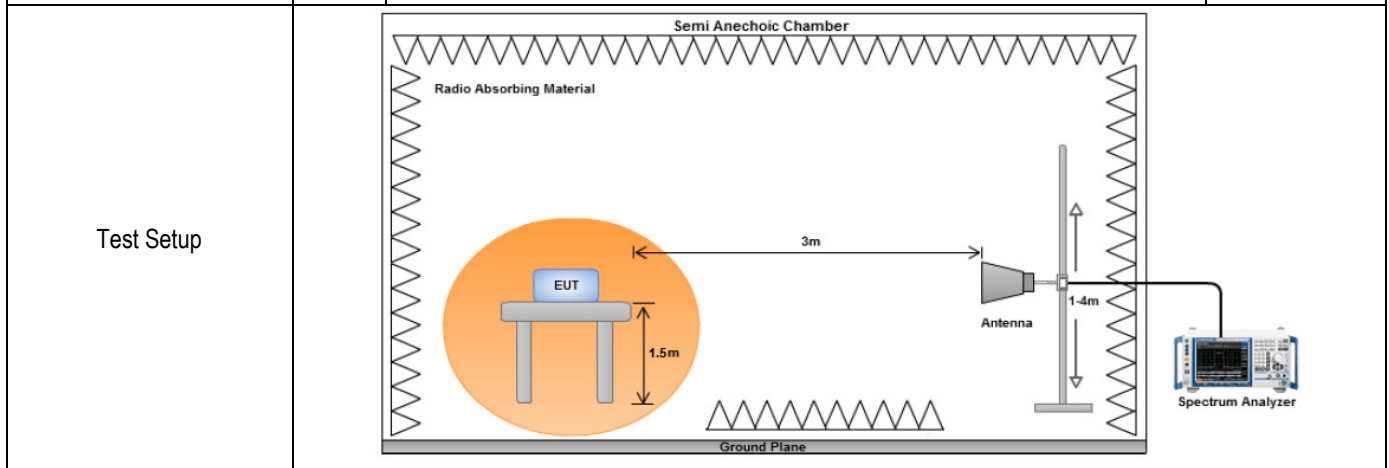
**f=30MHz – 1000MHz Measurements**

Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
30.75	40.64	0.81	-15.09	26.37	Quasi Max	V	149.00	134.00	40.00	-13.63	Pass
240.03	57.26	2.66	-26.84	33.08	Quasi Max	H	107.00	313.00	46.02	-12.94	Pass
433.33	57.99	3.67	-22.09	39.57	Quasi Max	V	183.00	219.00	46.02	-6.45	Pass
466.67	54.16	3.75	-21.69	36.23	Quasi Max	V	161.00	218.00	46.02	-9.79	Pass
499.97	49.79	4.01	-21.08	32.72	Quasi Max	V	109.00	272.00	46.02	-13.30	Pass
900.00	43.83	5.54	-15.77	33.61	Quasi Max	V	209.00	224.00	46.02	-12.41	Pass

### 10.1.3 Transmitter Radiated Spurious Emissions > 1GHz & Restricted band & non-restricted band emission

**Requirement(s):**

Specification(s)	Item	Requirement	Applicable
47CFR§15.247(d), RSS210(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  <input checked="" type="checkbox"/> 20 dB down <input 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 checked="" type="checkbox"/>



Procedure	Requirement
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.	

Test Date	09/21/2015 - 09/23/2015	Environmental conditions	Temperature 25°C Relative Humidity 45% Atmospheric Pressure 1027mbar
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**Remark** The EUT was scanned up to 26GHz. 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
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**Test Data**     Yes (See below)     N/A

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

## Radiated Emission Test Results (Above 1GHz)

### Bluetooth BDR – 2402MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
4799.08	34.55	6.24	9.73	50.52	Peak Max	H	164.00	245.00	74.00	-23.48	Pass
14063.74	39.39	12.74	7.49	59.62	Peak Max	H	280.00	354.00	74.00	-14.38	Pass
17589.43	36.55	13.00	10.49	60.04	Peak Max	H	281.00	244.00	74.00	-13.96	Pass
4799.08	21.56	6.24	9.73	37.53	Average Max	H	164.00	245.00	54.00	-16.47	Pass
14063.74	26.99	12.74	7.49	47.22	Average Max	H	280.00	354.00	54.00	-6.78	Pass
17589.43	23.99	13.00	10.49	47.48	Average Max	H	281.00	244.00	54.00	-6.52	Pass

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

### Bluetooth BDR – 2441MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
4882.55	39.12	6.24	9.62	54.99	Peak Max	H	217.00	131.00	74.00	-19.01	Pass
13163.48	38.99	12.12	8.12	59.22	Peak Max	V	283.00	48.00	74.00	-14.78	Pass
17606.51	36.55	13.00	10.51	60.06	Peak Max	V	150.00	190.00	74.00	-13.94	Pass
4882.55	29.12	6.24	9.62	44.99	Average Max	H	217.00	131.00	54.00	-9.01	Pass
13163.48	26.40	12.12	8.12	46.64	Average Max	V	283.00	48.00	54.00	-7.36	Pass
17606.51	24.08	13.00	10.51	47.59	Average Max	V	150.00	190.00	54.00	-6.41	Pass

### Bluetooth BDR – 2480MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
4153.18	35.19	5.96	11.56	52.71	Peak Max	H	251.00	299.00	74.00	-21.29	Pass
14542.81	39.80	13.18	8.30	61.28	Peak Max	V	286.00	167.00	74.00	-12.72	Pass
17674.65	37.07	13.00	10.58	60.65	Peak Max	H	204.00	139.00	74.00	-13.35	Pass
4153.18	22.80	5.96	11.56	40.32	Average Max	H	251.00	299.00	54.00	-13.68	Pass
14542.81	26.46	13.18	8.30	47.94	Average Max	V	286.00	167.00	54.00	-6.06	Pass
17674.65	24.37	13.00	10.58	47.95	Average Max	H	204.00	139.00	54.00	-6.05	Pass

### Bluetooth EDR – 2402MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
4220.63	34.61	6.02	11.27	51.89	Peak Max	H	280.00	69.00	74.00	-22.11	Pass
12703.80	39.13	12.61	8.41	60.14	Peak Max	V	214.00	244.00	74.00	-13.86	Pass
17760.26	36.93	13.00	10.67	60.60	Peak Max	V	166.00	360.00	74.00	-13.40	Pass
4220.63	22.06	6.02	11.27	39.35	Average Max	H	280.00	69.00	54.00	-14.65	Pass
12703.80	25.87	12.61	8.41	46.89	Average Max	V	214.00	244.00	54.00	-7.11	Pass
17760.26	24.22	13.00	10.67	47.89	Average Max	V	166.00	360.00	54.00	-6.11	Pass

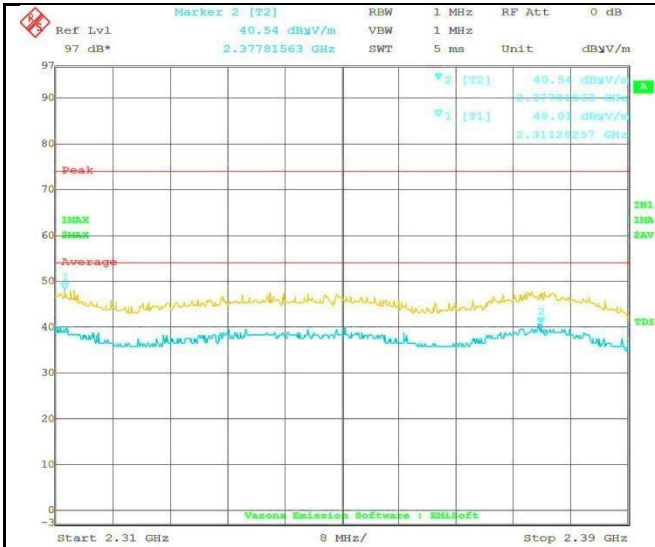
### Bluetooth EDR – 2441MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
4084.39	35.36	5.90	11.86	53.11	Peak Max	H	225.00	271.00	74.00	-20.89	Pass
12277.18	37.43	12.67	8.45	58.55	Peak Max	H	282.00	42.00	74.00	-15.45	Pass
17864.42	36.52	13.00	10.77	60.29	Peak Max	V	156.00	108.00	74.00	-13.71	Pass
4084.39	22.28	5.90	11.86	40.04	Average Max	H	225.00	271.00	54.00	-13.96	Pass
12277.18	25.25	12.67	8.45	46.37	Average Max	H	282.00	42.00	54.00	-7.63	Pass
17864.42	24.09	13.00	10.77	47.86	Average Max	V	156.00	108.00	54.00	-6.14	Pass

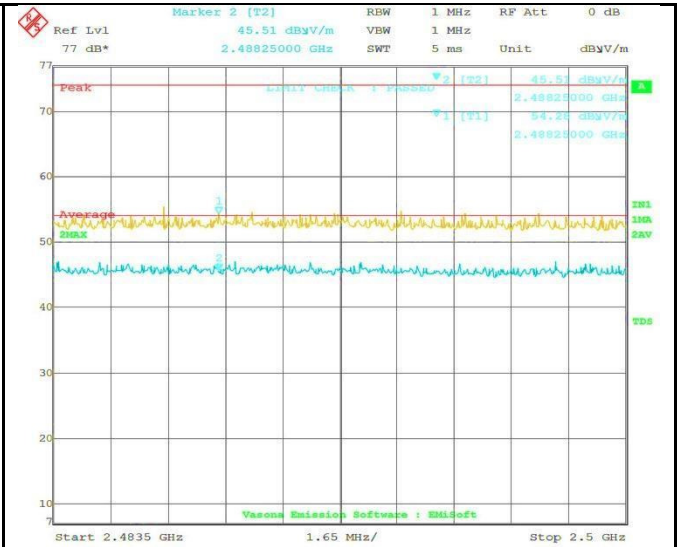
### Bluetooth EDR – 2480MHz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
4118.34	34.95	5.93	11.71	52.59	Peak Max	H	280.00	203.00	74.00	-21.41	Pass
14609.94	39.22	13.30	8.12	60.64	Peak Max	V	293.00	155.00	74.00	-13.36	Pass
17726.84	37.33	13.00	10.63	60.96	Peak Max	V	282.00	253.00	74.00	-13.04	Pass
4118.34	22.27	5.93	11.71	39.91	Average Max	H	280.00	203.00	54.00	-14.09	Pass
14609.94	26.55	13.30	8.12	47.97	Average Max	V	293.00	155.00	54.00	-6.03	Pass
17726.84	24.51	13.00	10.63	48.14	Average Max	V	282.00	253.00	54.00	-5.86	Pass

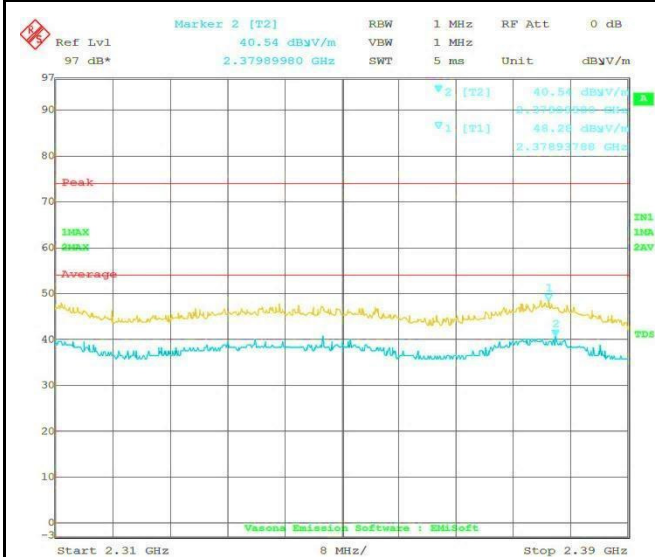
**Restricted Band Test plot (Bluetooth BDR/EDR)**



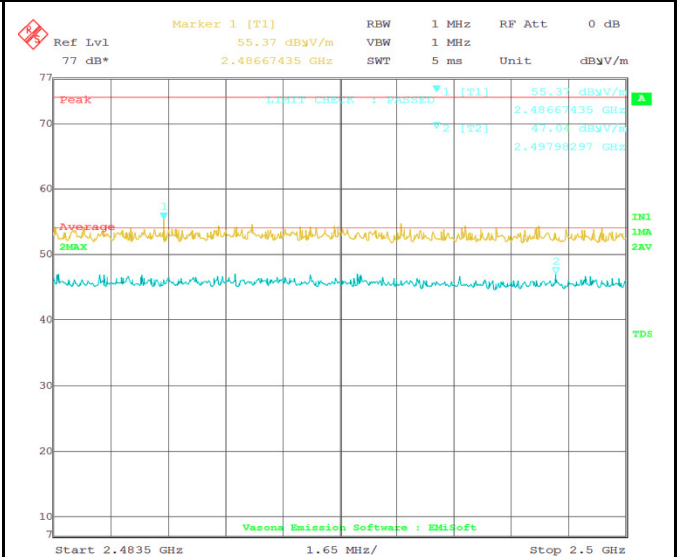
**Restricted Band Low BDR**



**Restricted Band High BDR**



**Restricted Band Low EDR**

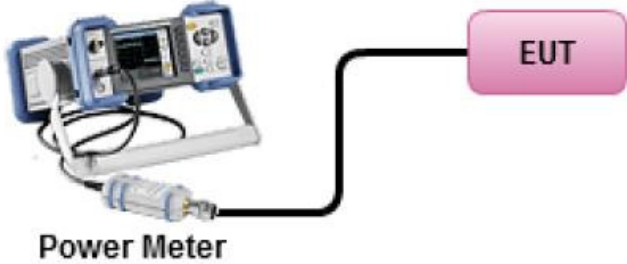


**Restricted Band High EDR**



## 10.2 Peak Output Power (Bluetooth BDR/EDR)

### Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	a)	For frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: below 1 Watt (inclusive).	<input checked="" type="checkbox"/>
	b)	Power reduction (antenna gain > 6dBi)	<input type="checkbox"/>
§ 15.247		Frequency hopping systems operated in 2400-2483.5MHz with output power not greater than 125mW, the intervals of hopping channel carrier frequencies shall not be less than 25kHz or two thirds of the 20dB bandwidth of the hopping channel, whichever is greater.	<input type="checkbox"/>
Test Setup	 <p>The diagram illustrates the test setup. On the left, a blue and white Power Meter is shown with various cables connected to it. A black cable runs from the Power Meter to a pink rectangular box on the right labeled 'EUT' (Equipment Under Test).</p>		
Test Procedure	<p><u>Maximum output power measurement procedure</u></p> <ul style="list-style-type: none"> <li>- Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel.</li> <li>- RBW &gt; 20 dB bandwidth of the emission being measured;</li> <li>- VBW ≥ RBW.</li> <li>- Detector = peak.</li> <li>- Sweep time = auto couple.</li> <li>- Trace mode = max hold.</li> <li>- Allow trace to fully stabilize.</li> <li>- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.</li> </ul>		
Test Date	09/21/2015 - 09/23/2015	Environmental conditions	Temperature 25°C Relative Humidity 45% Atmospheric Pressure 1027mbar
Remark	-		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

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

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
















**Output Power measurement results**








Type	Freq (MHz)	Test mode	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	2402	Bluetooth BDR	Low	1.62	≤30	Pass
Output power	2441	Bluetooth BDR	Mid	1.90	≤30	Pass
Output power	2480	Bluetooth BDR	High	1.77	≤30	Pass
Output power	2402	Bluetooth EDR	Low	0.95	≤30	Pass
Output power	2441	Bluetooth EDR	Mid	1.23	≤30	Pass
Output power	2480	Bluetooth EDR	High	1.14	≤30	Pass

## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Cycle	Cal Due	In use
<b>Conducted Emissions</b>					
R & S Receiver	ESHS10	830223/0009	1 Year	06/24/2016	<input type="checkbox"/>
Spectrum Analyzer	FSIQ7	825555/013	1 Year	08/04/2016	<input type="checkbox"/>
Schwarzbeck LISN	NNLK 8129	8129-190	1 Year	08/21/2016	<input type="checkbox"/>
CHASE LISN	MN2050B	1018	1 Year	08/07/2016	<input type="checkbox"/>
<b>Radiated Emissions</b>					
EMI Test Receiver	ESL6	100178	1 Year	05/27/2016	<input checked="" type="checkbox"/>
ETS-Lingren Loop Antenna	6512	00049120	1 Year	08/20/2016	<input checked="" type="checkbox"/>
Antenna - Biconlog (30 MHz – 2 GHz)	JB1	A030702	1 Year	08/15/2016	<input type="checkbox"/>
DoubleRidged Waveguide Horn Antenna (1-18 GHz)	3115	10SL0059	1 Year	08/25/2016	<input checked="" type="checkbox"/>
Horn Antenna (18 GHz - 40 GHz)	AH-840	101013	1 Year	08/28/2016	<input checked="" type="checkbox"/>
RF Pre-Amplifier	LPA-6-30	11140711	1 Year	02/19/2016	<input checked="" type="checkbox"/>
Microwave Preamplifier (18 GHz - 40 GHz)	PA-840	181251	1 Year	02/19/2016	<input checked="" type="checkbox"/>
3 Meters SAC	3M	N/A	1 Year	10/30/2016	<input checked="" type="checkbox"/>
10 Meters SAC	10M	N/A	1 Year	05/06/2016	<input checked="" type="checkbox"/>
<b>RF Conducted Measurement</b>					
Spectrum Analyzer	N9010A	MY50210206	1 Year	08/20/2016	<input checked="" type="checkbox"/>
Power Sensor	EMPower7002-006	159814	1 Year	09/03/2016	<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, A2, A3, A4, B1, B2, B3, B4, C</a>
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)		<a href="#">Phase I, 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>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