



RF TEST REPORT



Report No.: FCC_RF_SL15060501-CPC-006_UNII
Supersede Report No.:

Applicant	:	ChargePoint, Inc
Product Name	:	Network Communication
Model No.	:	28010077
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	W38-28010077
IC ID	:	8854A-2801007
Dates of test	:	06/22/2015 to 06/26/2015
Issue Date	:	06/26/2015
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:	
	
Ricky Wang	Nima Molaei
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:
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

Report No.	Report Version	Description	Issue Date
FCC_RF_SL15060501-CPC-006_UNII	None	Original	06/26/2015

2 Executive Summary

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

Company: ChargePoint, Inc.
Product: Network Communication
Model: 28010077

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	:	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
Model No.	:	28010077
Trade Name	:	ChargePoint
Serial No.	:	N/A
Host Model No.	:	N/A
Input Power	:	100-240VDC, 50/60Hz
Power Adapter Manu/Model	:	Condor/HK-CH13-A05
Power Adapter SN	:	N/A
Product Hardware version	:	27-010077
Product Software version	:	4.0.0.41
Radio Hardware version	:	27-010077
Radio Software version	:	4.0.0.41
Test Software version	:	4.0.0.41
Date of EUT received	:	May 01, 2015
Equipment Class/ Category	:	UNII
Clock Frequencies	:	N/A
Port/Connectors	:	N/A

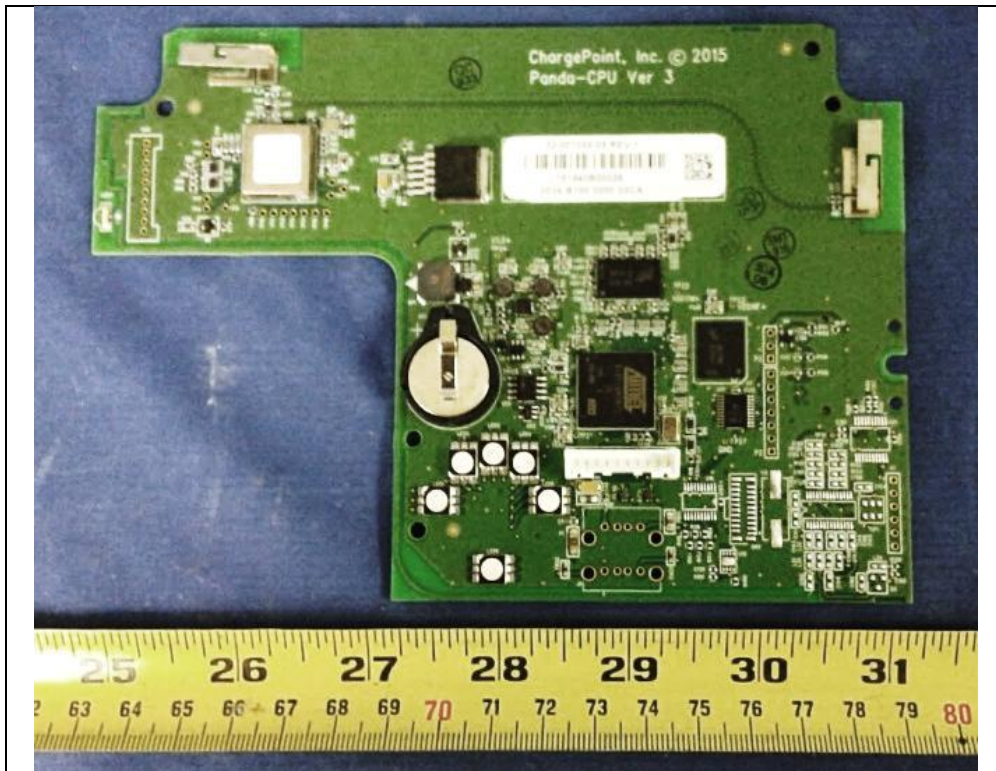
6.2 Radio Description

Radio Type	802.11a
Operating Frequency	5180-5240MHz 5745-5825MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz
Number of Channels	9
Antenna Type	Prestta WLAN Embedded Antenna
Antenna Gain (Peak)	3.5dBi (for 5GHz)
Antenna Connector Type	On Board
Note	-

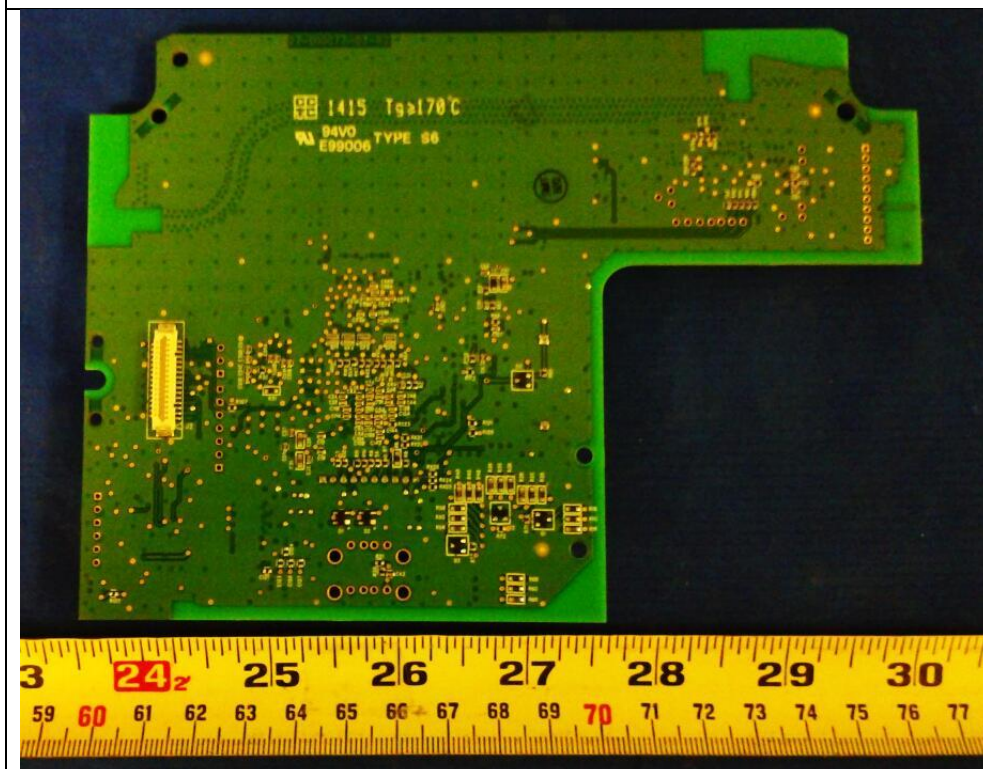
EUT Power Settings

Band	Mode	Frequency	Power setting
5150-5250MHz	802.11a	5180	20
		5200	20
		5240	20
5725-5850MHz	802.11a	5745	20
		5785	20
		5825	20

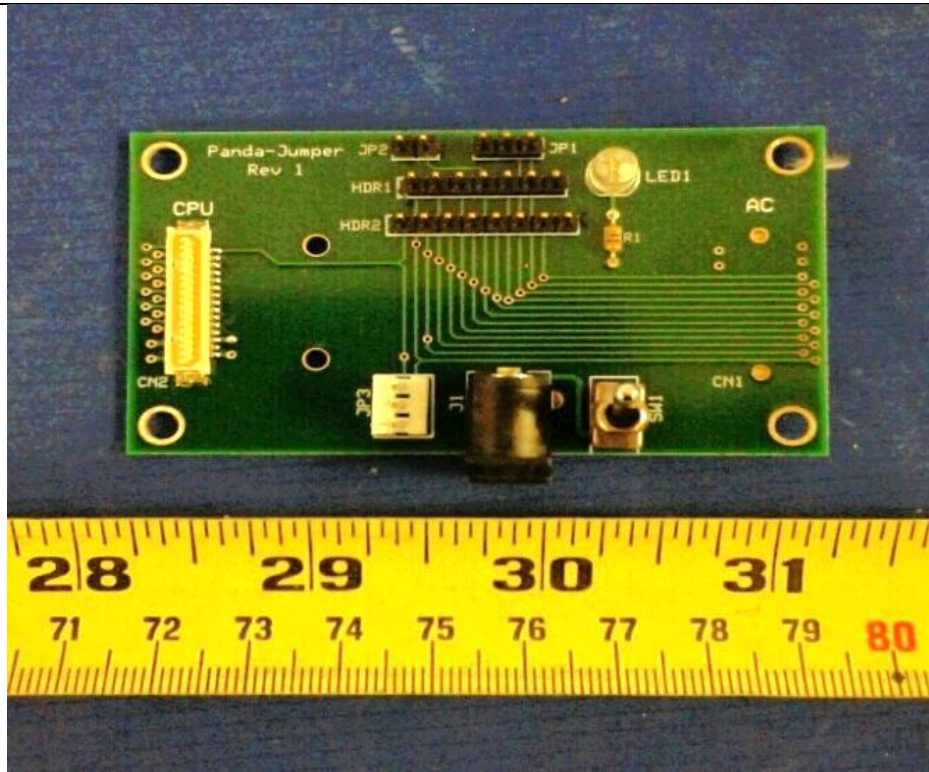
6.3 EUT Photos



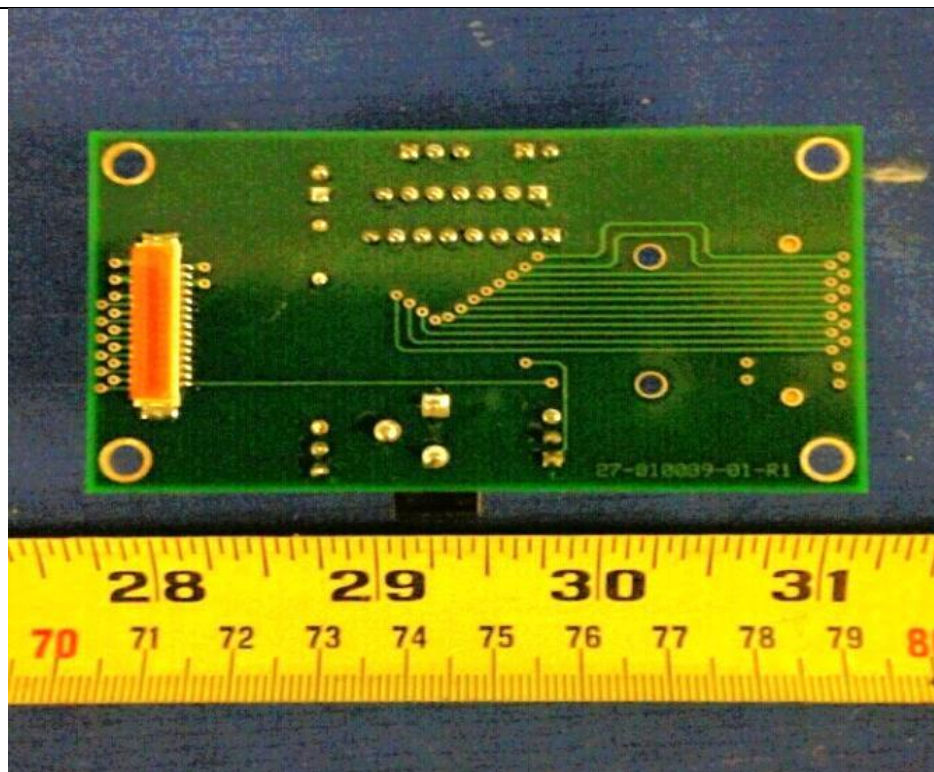
EUT Top View



EUT Bottom View



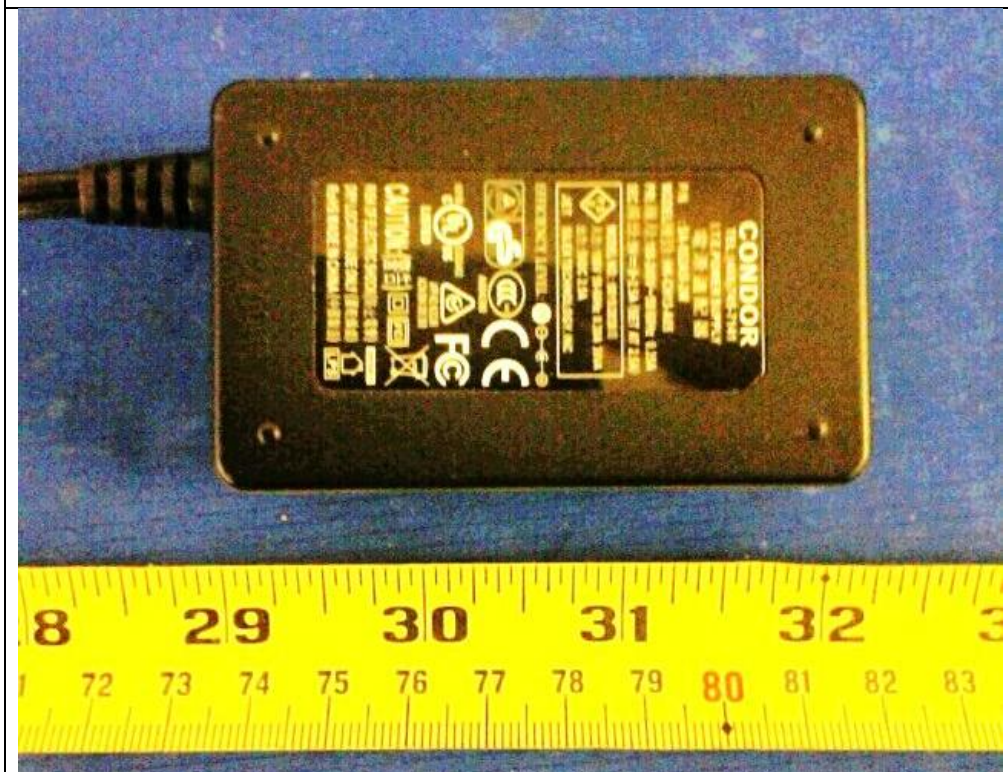
PCBA2 –Top View



PCBA2 –Top View



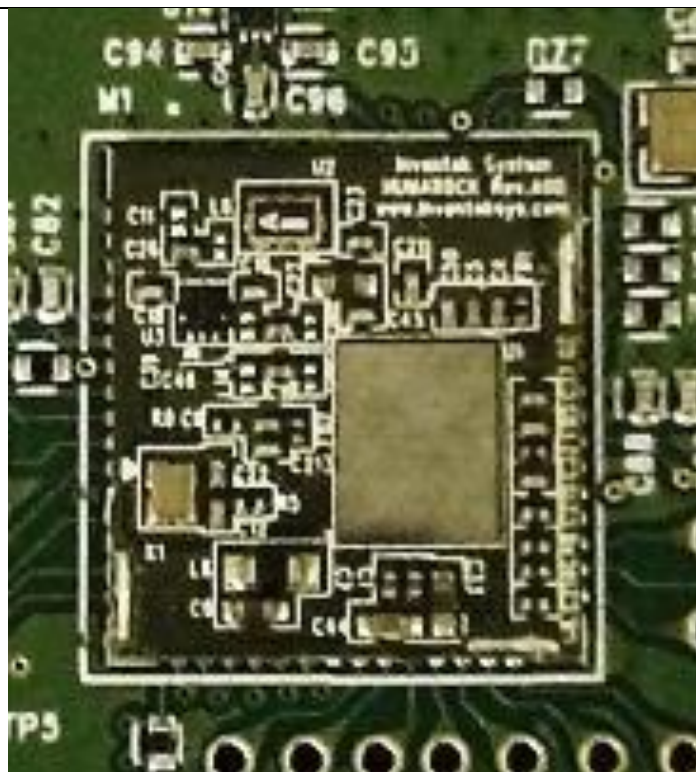
Power Supply – Top View



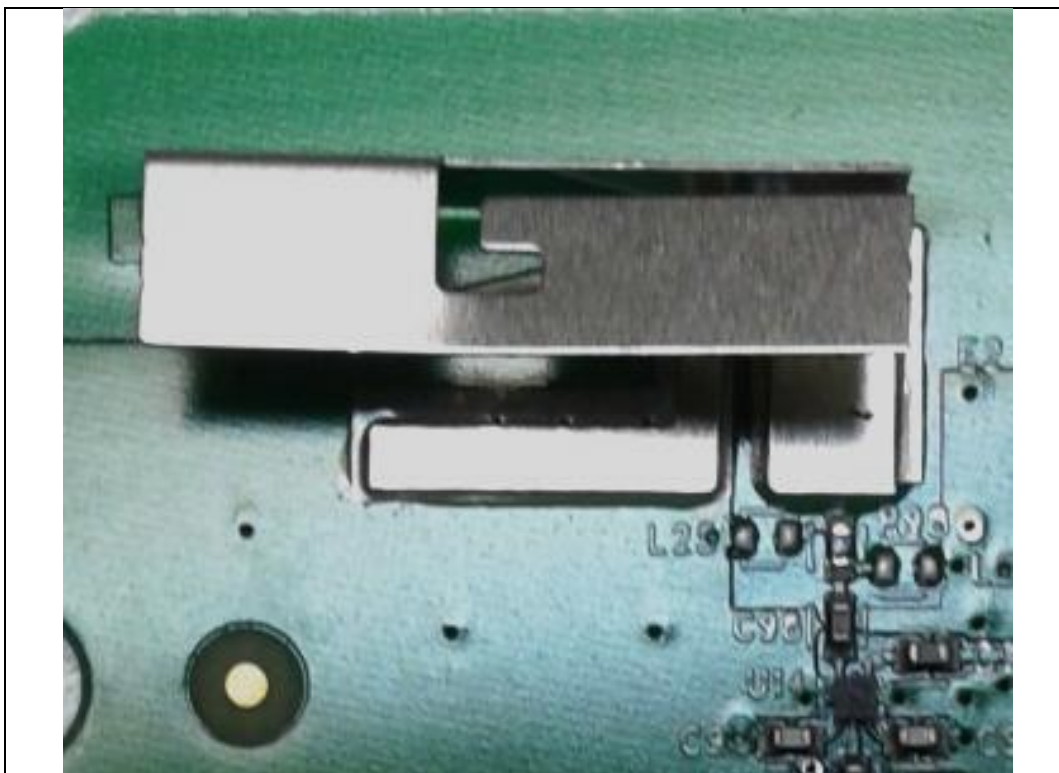
Power Supply – Bottom View



EUT Radio with shielding



EUT Radio without shielding



Antenna 1

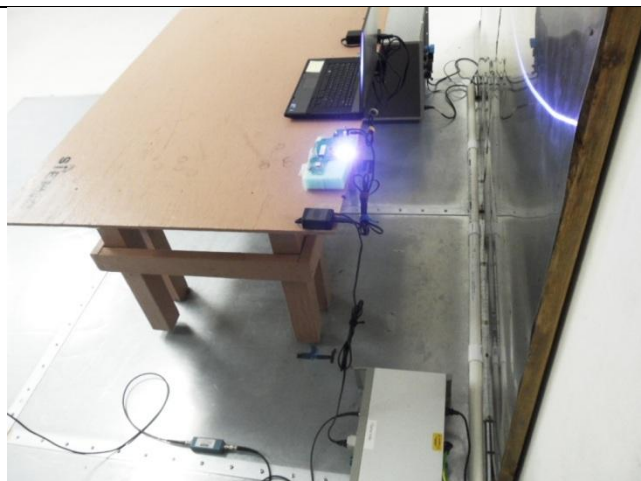


Antenna 2

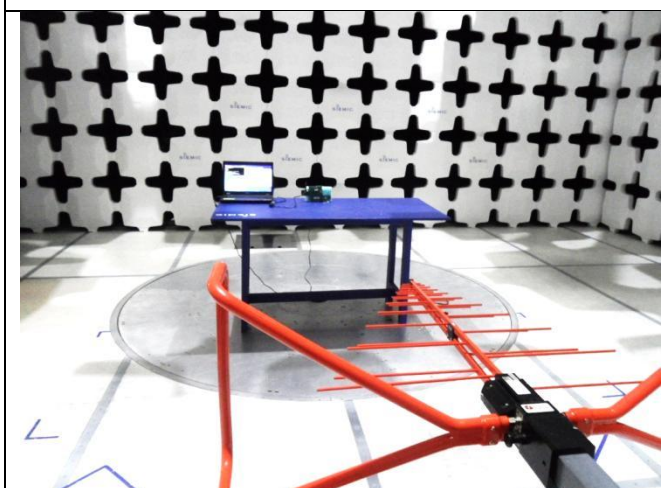
6.4 EUT Test Setup Photos



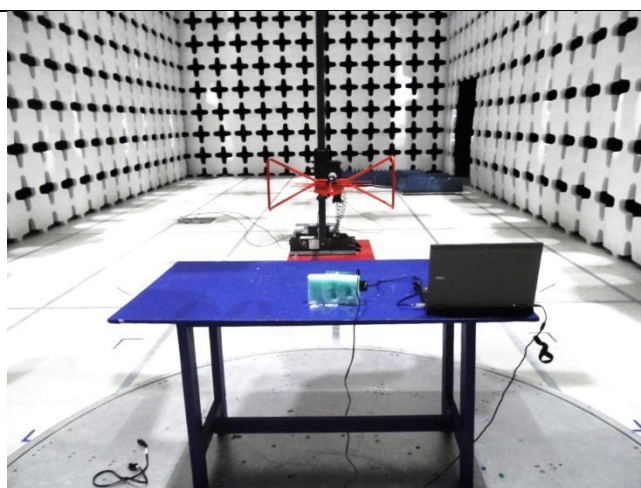
AC Line Conducted Emissions – Front View



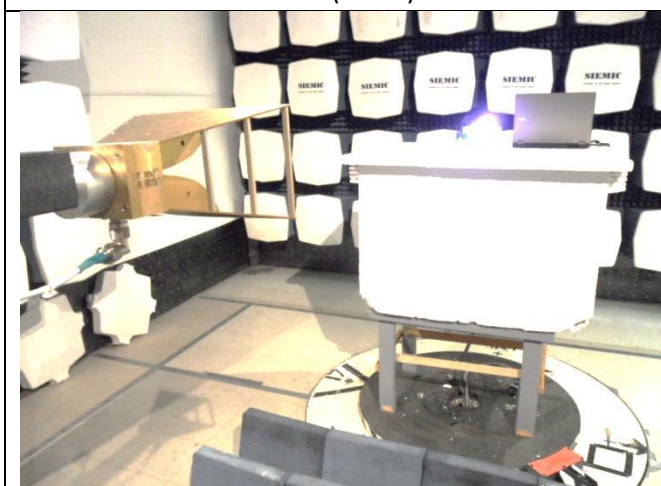
AC Line Conducted Emissions – Rear View



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	2	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	ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v01	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.10: 2013	<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 v01	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	<input checked="" type="checkbox"/> Pass <input 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 C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v01	<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 v01	<input checked="" type="checkbox"/> Pass <input 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	1. All measurement uncertainties are not taken into consideration for all presented test result. 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.			

9 Measurement Uncertainty

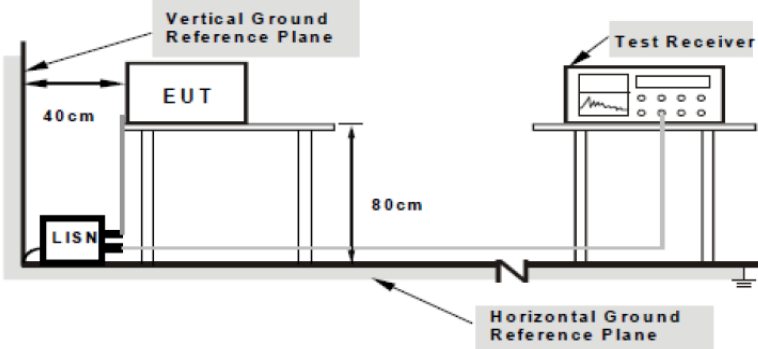
Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious 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 Conducted Emissions

Conducted Emission Limit

Frequency ranges (MHz)	Limit (dBuV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

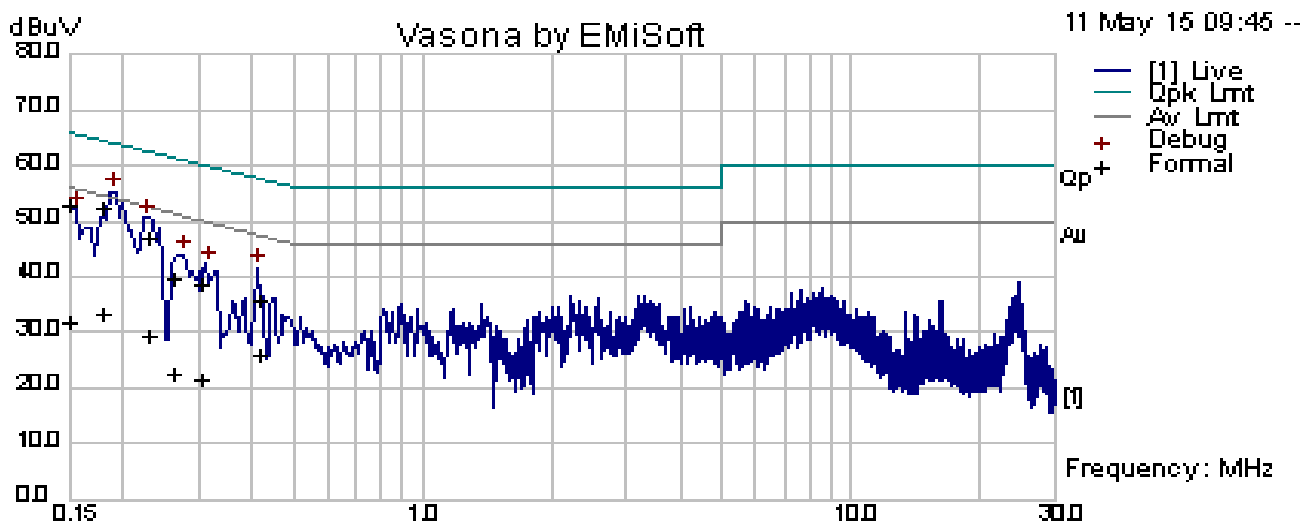
Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	<input checked="" type="checkbox"/>
Test Setup	 <p>Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>		
Procedure	<ul style="list-style-type: none"> - The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply. 		
Remark	EUT was tested at 120VAC, 60Hz		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	05/11/2015			
Remarks	AC Line @ Line			

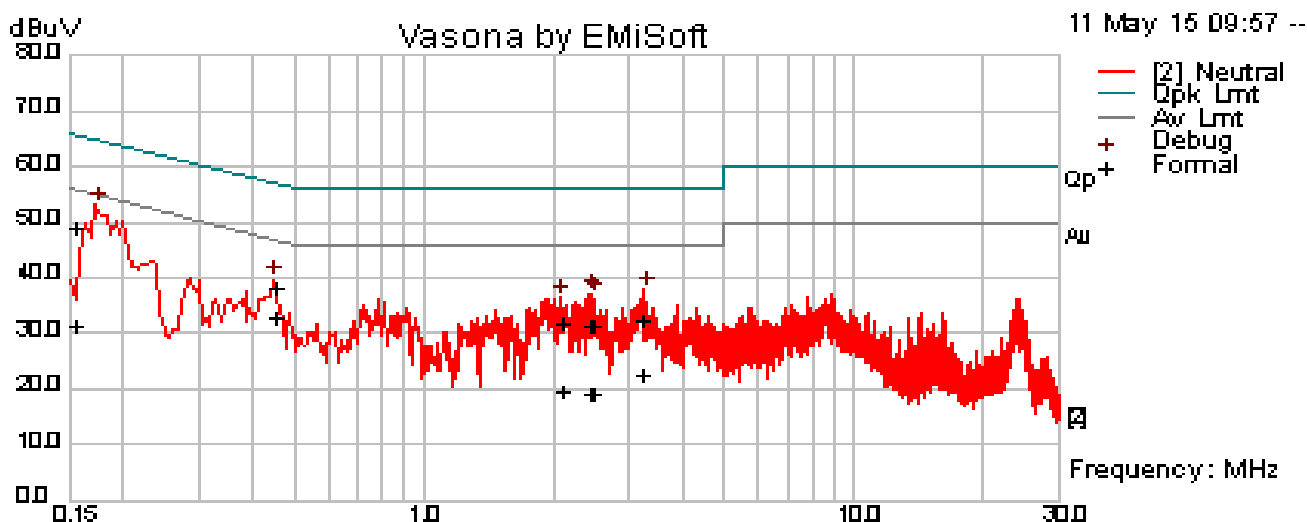


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.18	41.55	10.00	0.75	52.30	Quasi Peak	Line	64.50	-12.21	Pass
0.23	36.17	10.00	0.73	46.91	Quasi Peak	Line	62.41	-15.51	Pass
0.15	42.41	10.00	0.76	53.17	Quasi Peak	Line	66.00	-12.83	Pass
0.42	25.21	10.01	0.73	35.95	Quasi Peak	Line	57.47	-21.52	Pass
0.26	28.79	10.00	0.72	39.52	Quasi Peak	Line	61.30	-21.78	Pass
0.30	28.03	10.00	0.71	38.74	Quasi Peak	Line	60.15	-21.41	Pass
0.18	22.49	10.00	0.75	33.24	Average	Line	54.50	-21.27	Pass
0.23	18.80	10.00	0.73	29.54	Average	Line	52.41	-22.88	Pass
0.15	21.20	10.00	0.76	31.96	Average	Line	56.00	-24.04	Pass
0.42	15.26	10.01	0.73	26.00	Average	Line	47.47	-21.47	Pass
0.26	11.76	10.00	0.72	22.49	Average	Line	51.30	-28.81	Pass
0.30	11.04	10.00	0.71	21.75	Average	Line	50.15	-28.40	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	05/11/2015			
Remarks	AC Line @ Neutral			




Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.16	38.16	10.00	0.75	48.92	Quasi Peak	Neutral	65.69	-16.77	Pass
0.45	27.49	10.01	0.73	38.23	Quasi Peak	Neutral	56.86	-18.64	Pass
3.25	21.23	10.03	1.00	32.26	Quasi Peak	Neutral	56.00	-23.74	Pass
2.45	20.56	10.03	0.96	31.55	Quasi Peak	Neutral	56.00	-24.46	Pass
2.48	20.36	10.03	0.96	31.35	Quasi Peak	Neutral	56.00	-24.66	Pass
2.08	21.13	10.02	0.95	32.11	Quasi Peak	Neutral	56.00	-23.89	Pass
0.16	20.60	10.00	0.75	31.36	Average	Neutral	55.69	-24.33	Pass
0.45	21.91	10.01	0.73	32.65	Average	Neutral	46.86	-14.22	Pass
3.25	11.62	10.03	1.00	22.65	Average	Neutral	46.00	-23.35	Pass
2.45	8.09	10.03	0.96	19.08	Average	Neutral	46.00	-26.92	Pass
2.48	8.09	10.03	0.96	19.08	Average	Neutral	46.00	-26.92	Pass
2.08	8.63	10.02	0.95	19.60	Average	Neutral	46.00	-26.40	Pass

Note: The results above show only the worst case.

10.2 26 dB Bandwidth & 6 dB Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	-	26 dB Emission BW: Report only for reference.	<input checked="" type="checkbox"/>
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	<input type="checkbox"/>
	e)	Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>789033 D02 General UNII Test Procedures New Rules v01</p> <p><u>26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz)</u></p> <ul style="list-style-type: none"> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. <ul style="list-style-type: none"> o Set RBW = around 1% of emission bandwidth o Set VBW > RBW o Detector = Peak o Trace mode = max hold - Capture the plot. - Repeat above steps for different test channel and other modulation type. <p><u>6 dB Minimum emission bandwidth measurement procedure (for 5.725-5.85 GHz)</u></p> <ul style="list-style-type: none"> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 6dB BW. <ul style="list-style-type: none"> o Set RBW = 100 KHz o Set VBW ≥ 3 x RBW o Detector = Peak o Trace mode = max hold o Sweep = auto couple - Capture the plot. - Repeat above steps for different test channel and other modulation type. 		
Test Date	06/23/2015	Environmental condition	Temperature 22°C Relative Humidity 38% Atmospheric Pressure 1020mbar
Remark	None		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Equipment Setting

Test	RBW	VBW	Span	Detector	Sweep	Trace	Notes
26 dB Emission Bandwidth	1% of 26 dB EBW	>RBW	>EBW	PK	Auto	Maxhold	-
6 dB Bandwidth	100 KHz	≥3 x RBW	1.5 - 5 times of OBW	PK	Auto	Maxhold	-

Test Data ☒ Yes ☐ N/A
Test Plot ☒ Yes ☐ N/A

26dB Bandwidth measurement result for 5.2GHz

Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
802.11a	5180	Low	19.11	-
	5200	Mid	19.07	-
	5240	High	18.96	-

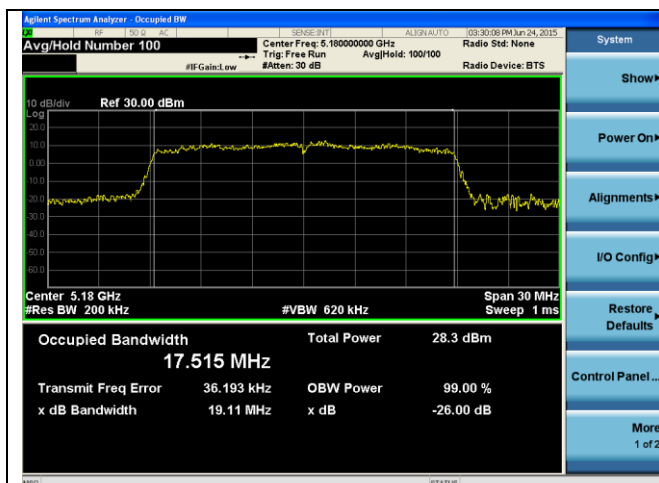
99% Bandwidth measurement result for 5.2GHz

Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
802.11a	5180	Low	17.53	-
	5200	Mid	17.52	-
	5240	High	17.52	-

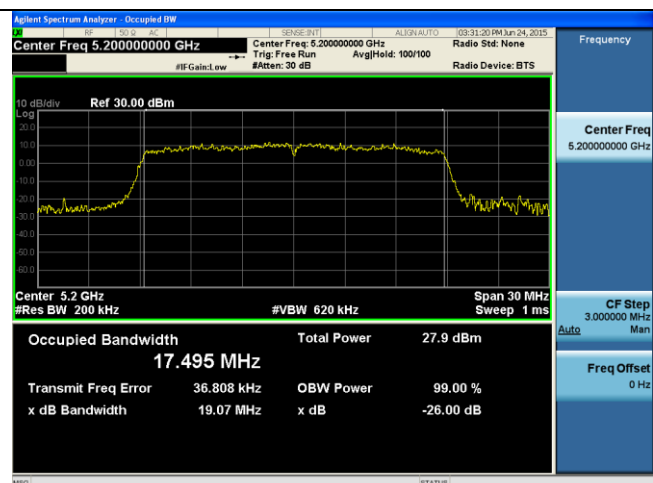
6dB Bandwidth measurement result for 5.8GHz

Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
802.11a	5745	Low	17.52	≥0.5	Pass
	5785	Mid	17.52	≥0.5	Pass
	5825	High	17.50	≥0.5	Pass

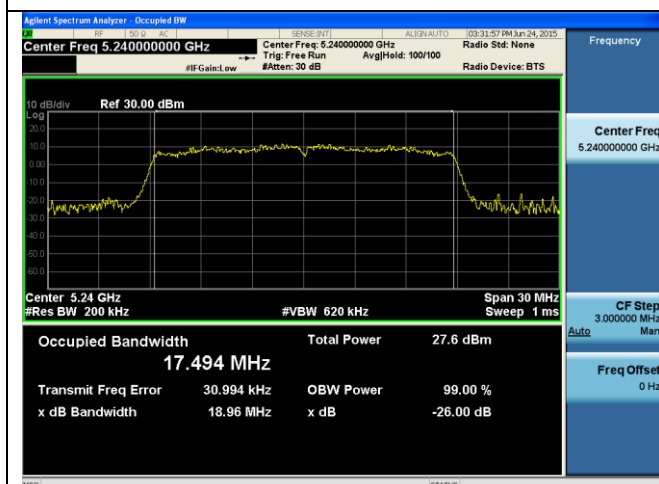
26dB Bandwidth Test Plots



26dB BW - 802.11a 5180MHz

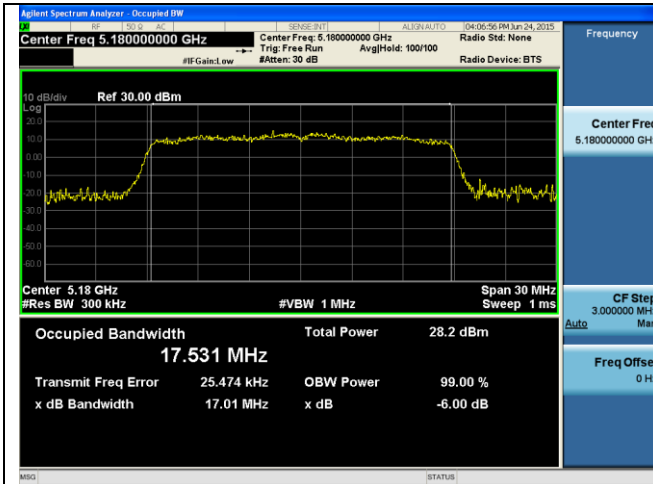


26dB BW - 802.11a 5200MHz

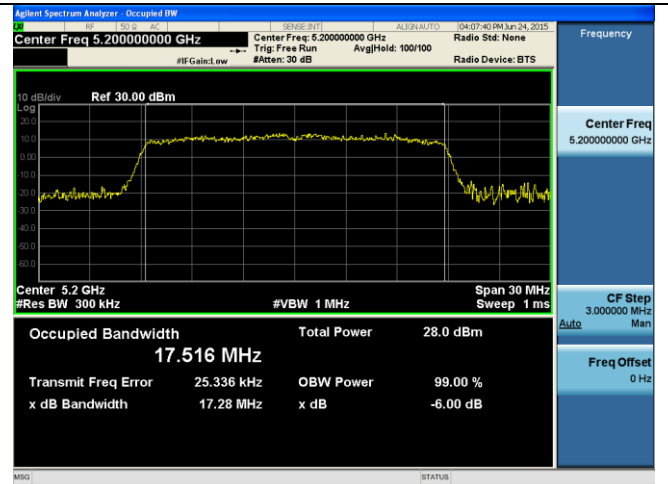


26dB BW - 802.11a 5240MHz

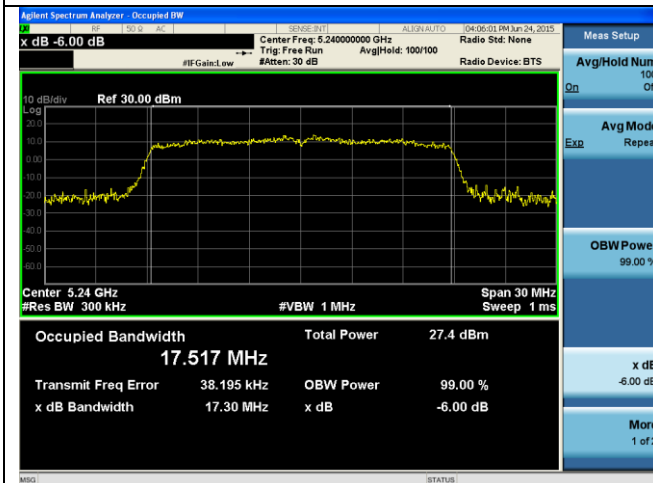
99% Bandwidth Test Plots



99% BW - 802.11a 5180MHz

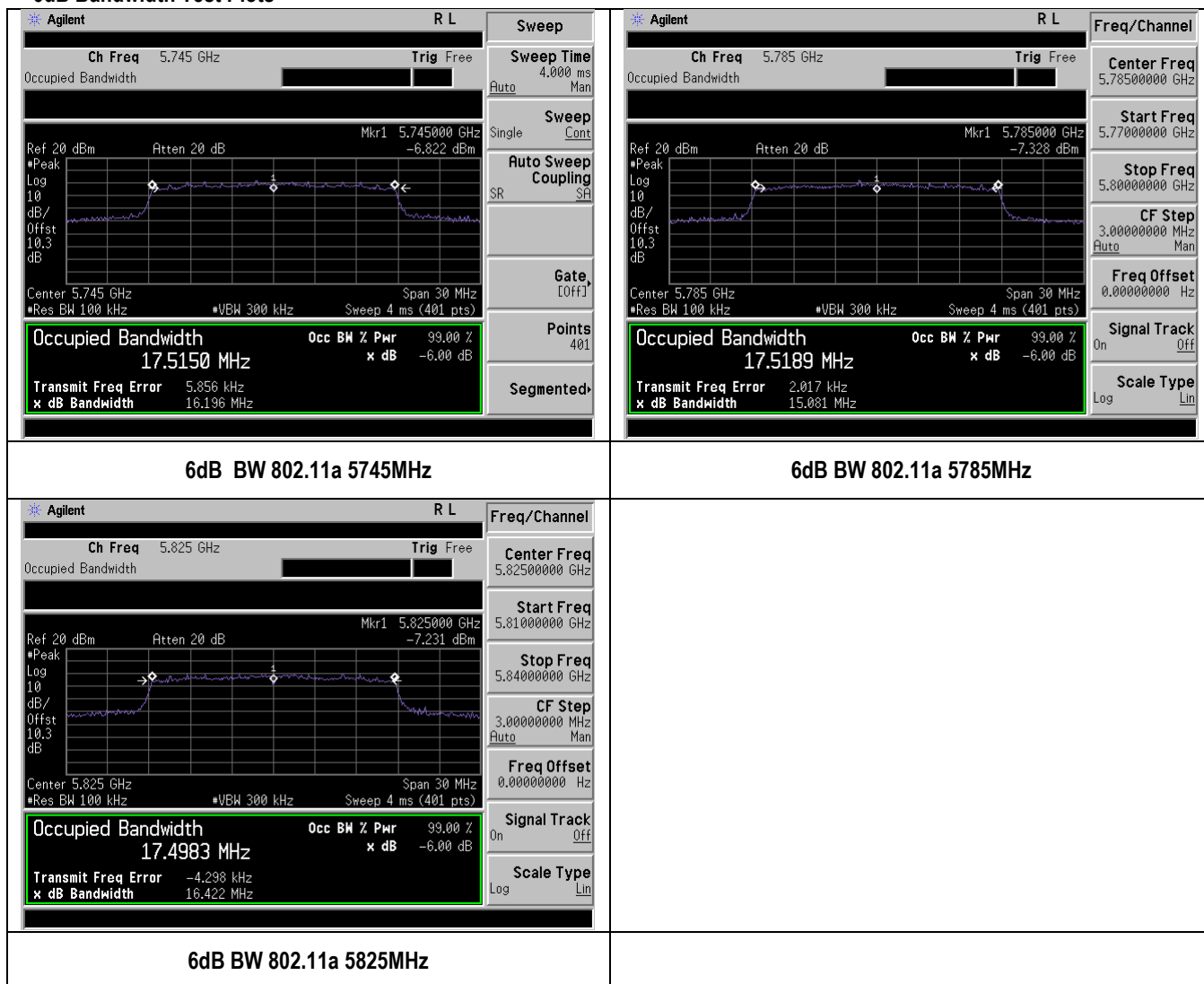


99% BW - 802.11a 5200MHz



99% BW - 802.11a 5240MHz

6dB Bandwidth Test Plots



10.3 Peak Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(1)(i)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).	<input type="checkbox"/>
	a)(1)(ii)	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.	<input checked="" type="checkbox"/>
	a)(1)(iii)	For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.	<input type="checkbox"/>
	a)(1)(iv)	For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.	<input type="checkbox"/>
	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.	<input type="checkbox"/>
	a)(3)	For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.	<input checked="" type="checkbox"/>

Test Setup

Average Power
Meter

EUT

Test Procedure

789033 D02 General UNII Test Procedures New Rules v01

Measurement using a Power Meter (PM)

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

- Connect EUT's RF output power to power meter
- Set EUT to be continuous transmission mode
- Measurement the average output power using power meter and record the result
- Repeat above steps for different test channel and other modulation type.

Test Date

06/23/2015

Environmental
condition

Temperature 21°C
Relative Humidity 40%
Atmospheric Pressure 1019mbar

Remark

-

Result

☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Output Power measurement result for 5.2GHz


Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
802.11a	5180	Low	11.45	30	Pass
	5200	Mid	12.27	30	Pass
	5240	High	12.33	30	Pass

Output Power Measurement Results for 5.8GHz

Test mode	Freq(MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
802.11a	5745	Low	11.73	30	Pass
	5785	Mid	11.89	30	Pass
	5825	High	11.55	30	Pass

10.4 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(1)(i)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	<input checked="" type="checkbox"/>
	a)(1)(ii)	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	<input type="checkbox"/>
	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.	<input type="checkbox"/>
	a)(3)	For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1</p> <p>Maximum spectral density measurement procedure</p> <ul style="list-style-type: none"> - Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. - Set RBW = 1 MHz - Set VBW ≥ 3 MHz - Detector = RMS. - Sweep time = auto couple. - Trace mode = max hold. - Trace average at least 100 traces in power averaging - Use the peak marker function to determine the maximum amplitude level within the RBW. <p>Apply correction to the result if different RBW is used.</p>		
Test Date	06/23/2015	Environmental condition	Temperature 22°C Relative Humidity 42% Atmospheric Pressure 1020mbar
Remark	-		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Equipment Setting

Test	RBW	VBW	Span	Detector	Sweep	Trace	Notes
PSD	1MHz	≥3MHz	>EBW	RMS	Auto	Average	-

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

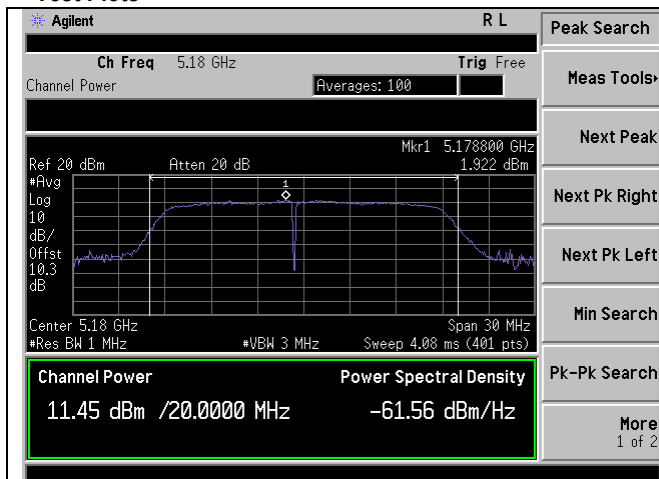
PSD measurement result for 5.2GHz

Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	5180	Low	1.922	17	Pass
	5200	Mid	2.712	17	Pass
	5240	High	2.614	17	Pass

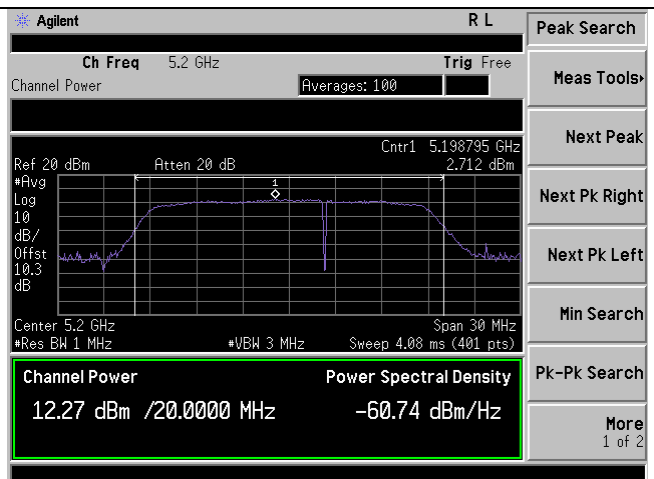
PSD measurement result for 5.8GHz

Test Mode	Freq (MHz)	CH	Conducted PSD (dBm/100KHz)	Correction Factor (dB)	Combined PSD (dBm/500KHz)	Limit (dBm/500KHz)	Result
802.11a	5745	Low	-6.372	6.99	0.618	30	Pass
	5785	Mid	-6.422	6.99	0.568	30	Pass
	5825	High	-7.223	6.99	-0.233	30	Pass
BW correction factor = 10log(500kHz/RBW)							

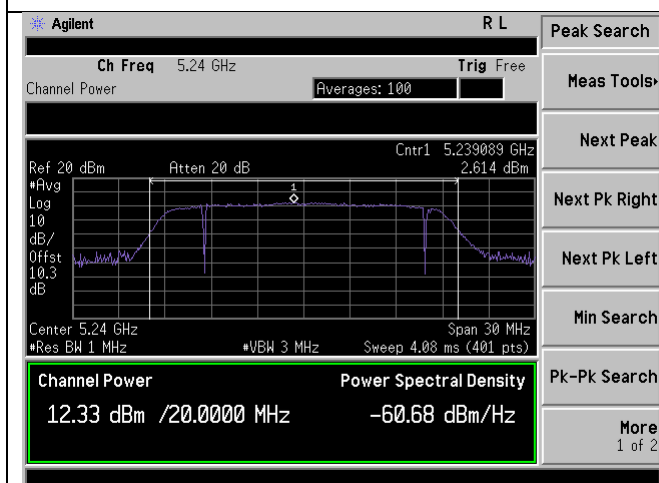
Test Plots



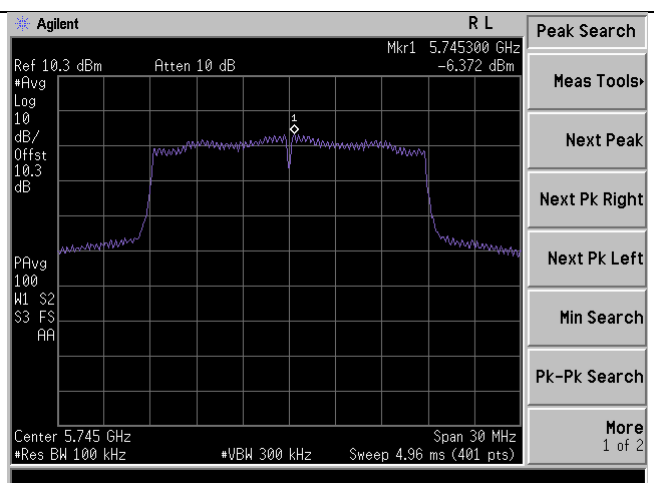
PSD-802.11a-5180MHz



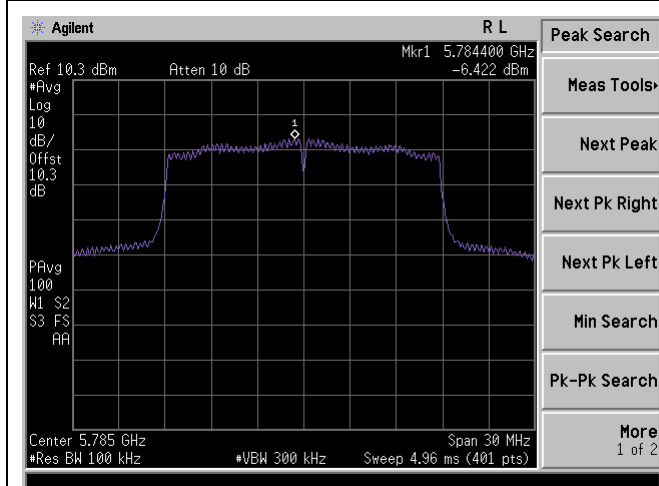
PSD-802.11a-5200MHz



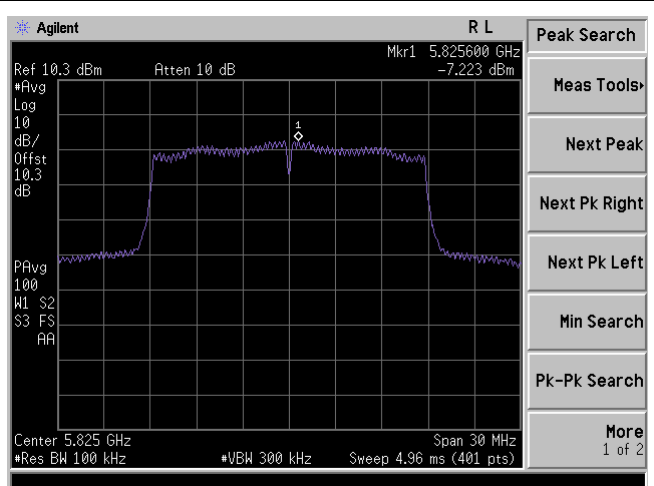
PSD-802.11a-5240MHz



PSD-802.11a-5745MHz



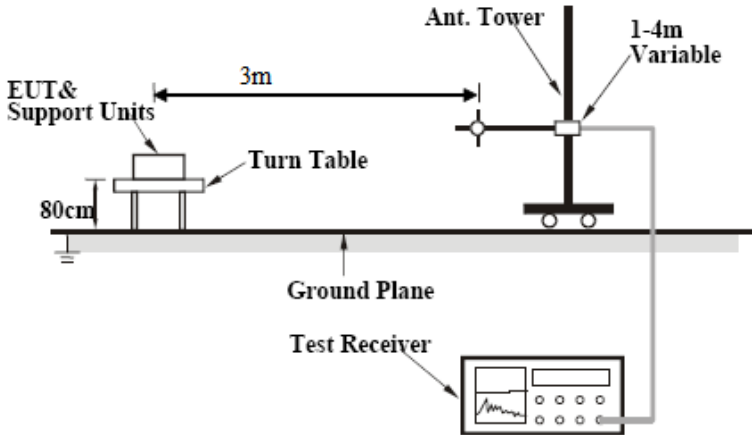
PSD-802.11a-5785MHz



PSD-802.11a-5825MHz

10.5 Radiated Emissions below 1GHz

Requirement(s):

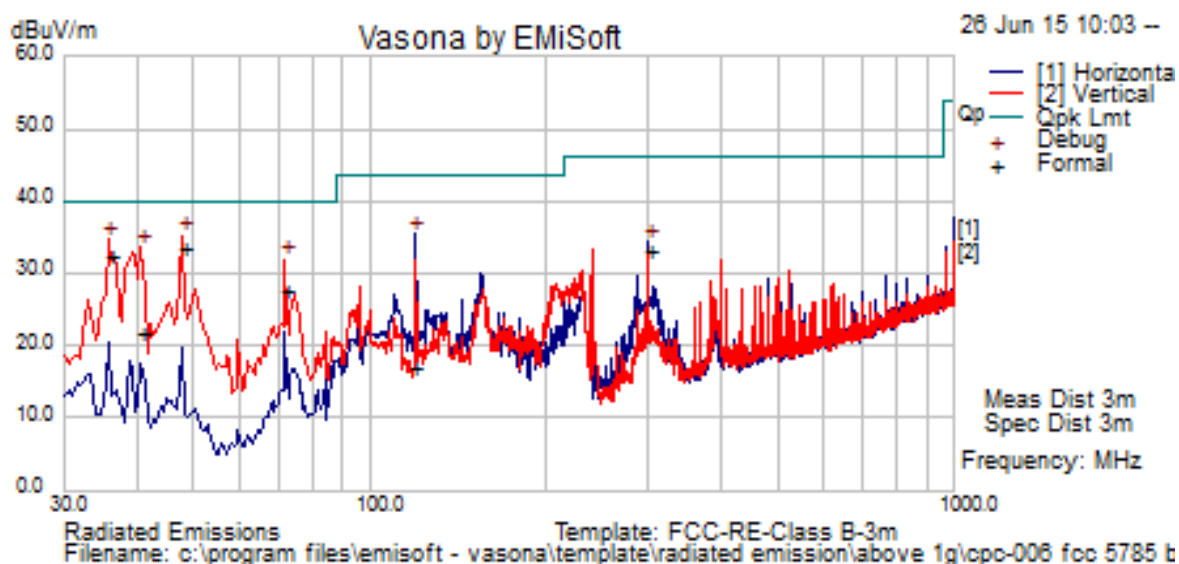
Spec	Requirement	Applicable										
47CFR§ 15.407(b) 15.209 (a)	<p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <table><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>☒</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.</div><div>The EUT was switched on and allowed to warm up to its normal operating condition.</div></div> <div><div>2.</div><div>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.</div><div>Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</div></div><div><div>b.</div><div>The EUT was then rotated to the direction that gave the maximum emission.</div></div><div><div>c.</div><div>Finally, the antenna height was adjusted to the height that gave the maximum emission.</div></div></div></div> <div><div>3.</div><div>A Quasi-peak measurement was then made for that frequency point.</div></div> <div><div>4.</div><div>Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</div></div>											
Remark	Both horizontal and vertical polarities were investigated. The results show only the worst case.											
Result	<div><div>☒ Pass</div><div>☐ Fail</div></div>											

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

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:	Teody Manansala			
Test Date:	06/26/2015			
Remarks:	802.11a-5785MHz			

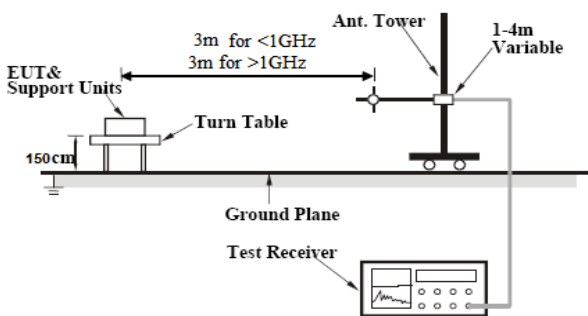


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Polarization	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
48.01	60.93	1.12	-28.47	33.58	Quasi Max	V	101.00	252.00	40.00	-6.42	Pass
35.99	53.91	1.04	-22.50	32.45	Quasi Max	V	100.00	26.00	40.00	-7.55	Pass
40.81	46.29	1.07	-25.48	21.88	Quasi Max	V	124.00	45.00	40.00	-18.12	Pass
119.62	39.80	1.98	-24.82	16.96	Quasi Max	H	178.00	285.00	43.52	-26.56	Pass
71.96	56.28	1.48	-30.04	27.72	Quasi Max	V	100.00	187.00	40.00	-12.28	Pass
300.00	55.31	2.96	-25.17	33.10	Quasi Max	H	120.00	108.00	46.02	-12.92	Pass

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

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

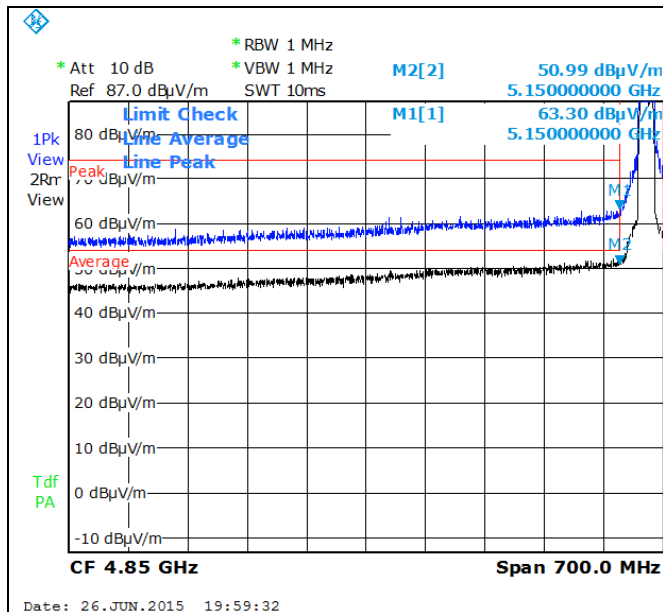
Equipment Setting

Test	RBW	VBW	Span	Detector	Sweep	Trace	Notes
Radiated Spurious Emission	1MHz	3MHz	1GHz - 40 GHz	Peak	Auto	Max hold	PK Measurement
Radiated Spurious Emission	1MHz	10Hz	1GHz - 40 GHz	Peak	Auto	Max hold	Ave Measurement

Test Data ☒ Yes (See below) ☐ N/A

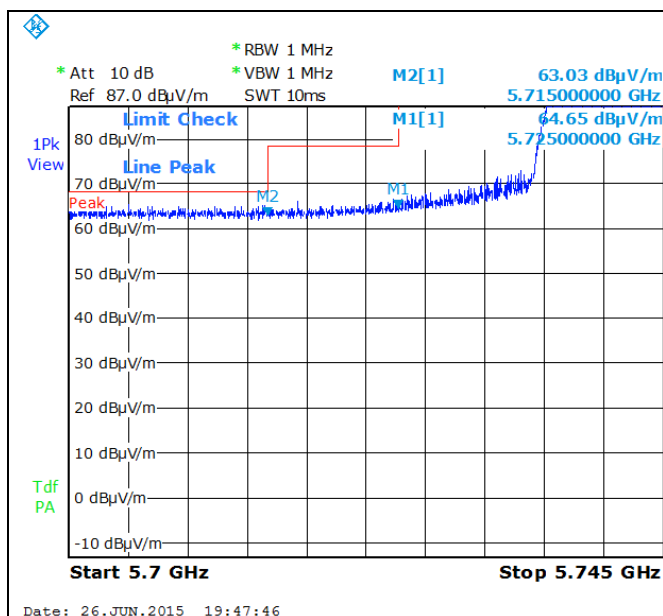
Test Plot ☒ Yes (See below) ☐ N/A

Restricted Band Measurement Plots:

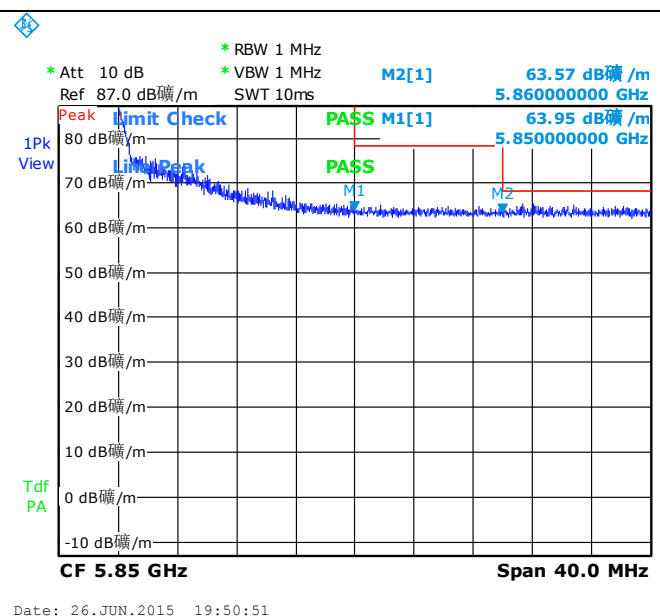


Restricted Band-802.11a 5180M– Edge Freq 5150MHz

Radiated Band Edge Measurement Plots:



Radiated Band Edge-802.11a 5745M– Edge Freq 5725MHz



Radiated Band Edge-802.11a 5825M– Edge Freq 5850MHz

Radiated Emission Test Results (Above 1GHz)

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
2064.34	43.29	3.58	11.27	58.15	Peak Max	V	180.00	168.00	74.00	-15.85	Pass
1001.05	45.69	2.44	9.68	57.81	Peak Max	H	209.00	17.00	74.00	-16.19	Pass
4010.75	40.59	5.84	12.18	58.61	Peak Max	V	155.00	120.00	74.00	-15.39	Pass
6247.93	45.74	7.63	10.47	63.85	Peak Max	V	271.00	274.00	74.00	-10.15	Pass
2064.34	30.18	3.58	11.27	45.04	Average Max	V	180.00	168.00	54.00	-8.96	Pass
1001.05	32.24	2.44	9.68	44.36	Average Max	H	209.00	17.00	54.00	-9.64	Pass
4010.75	26.95	5.84	12.18	44.97	Average Max	V	155.00	120.00	54.00	-9.03	Pass
6247.93	31.73	7.63	10.47	49.84	Average Max	V	271.00	274.00	54.00	-4.16	Pass

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
1972.68	42.92	3.30	11.26	57.48	Peak Max	V	171.00	198.00	74.00	-16.52	Pass
6158.87	45.15	7.37	10.68	63.20	Peak Max	H	262.00	25.00	74.00	-10.80	Pass
4119.84	40.25	5.93	11.70	57.88	Peak Max	V	290.00	48.00	74.00	-16.12	Pass
1972.68	29.71	3.30	11.26	44.27	Average Max	V	171.00	198.00	54.00	-9.73	Pass
6158.87	31.64	7.37	10.68	49.69	Average Max	H	262.00	25.00	54.00	-4.31	Pass
4119.84	26.91	5.93	11.70	44.55	Average Max	V	290.00	48.00	54.00	-9.45	Pass

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
1883.35	42.50	3.20	10.54	56.24	Peak Max	H	276.00	340.00	74.00	-17.76	Pass
4067.27	40.26	5.89	11.93	58.08	Peak Max	H	293.00	172.00	74.00	-15.92	Pass
2081.86	43.55	3.65	11.22	58.42	Peak Max	H	164.00	30.00	74.00	-15.58	Pass
6229.36	45.73	7.58	10.52	63.82	Peak Max	H	164.00	101.00	74.00	-10.18	Pass
1883.35	27.89	3.20	10.54	41.63	Average Max	H	276.00	340.00	54.00	-12.37	Pass
4067.27	26.67	5.89	11.93	44.48	Average Max	H	293.00	172.00	54.00	-9.52	Pass
2081.86	30.18	3.65	11.22	45.04	Average Max	H	164.00	30.00	54.00	-8.96	Pass
6229.36	31.75	7.58	10.52	49.84	Average Max	H	164.00	101.00	54.00	-4.16	Pass

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
1002.00	45.29	2.44	9.67	57.41	Peak Max	H	226.00	283.00	74.00	-16.59	Pass
1991.53	43.54	3.32	11.41	58.27	Peak Max	H	184.00	74.00	74.00	-15.73	Pass
6212.00	44.91	7.53	10.56	62.99	Peak Max	V	145.00	125.00	74.00	-11.01	Pass
4084.65	40.26	5.90	11.85	58.02	Peak Max	H	166.00	342.00	74.00	-15.98	Pass
1002.00	32.20	2.44	9.67	44.32	Average Max	H	226.00	283.00	54.00	-9.68	Pass
1991.53	29.58	3.32	11.41	44.31	Average Max	H	184.00	74.00	54.00	-9.69	Pass
6212.00	31.53	7.53	10.56	49.62	Average Max	V	145.00	125.00	54.00	-4.38	Pass
4084.65	26.82	5.90	11.85	44.57	Average Max	H	166.00	342.00	54.00	-9.43	Pass

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
1056.04	45.16	2.47	9.59	57.22	Peak Max	V	182.00	124.00	74.00	-16.78	Pass
1990.73	43.27	3.32	11.41	58.00	Peak Max	V	99.00	6.00	74.00	-16.00	Pass
6340.13	44.81	7.91	10.26	62.97	Peak Max	V	222.00	261.00	74.00	-11.03	Pass
4048.33	40.39	5.87	12.01	58.27	Peak Max	H	133.00	286.00	74.00	-15.73	Pass
1056.04	31.56	2.47	9.59	43.62	Average Max	V	182.00	124.00	54.00	-10.38	Pass
1990.73	29.67	3.32	11.41	44.40	Average Max	V	99.00	6.00	54.00	-9.60	Pass
6340.13	31.77	7.91	10.26	49.93	Average Max	V	222.00	261.00	54.00	-4.07	Pass
4048.33	26.65	5.87	12.01	44.54	Average Max	H	133.00	286.00	54.00	-9.46	Pass
















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
2065.64	44.10	3.59	11.27	58.95	Peak Max	H	248.00	122.00	74.00	-15.05	Pass
1019.15	45.82	2.45	9.65	57.92	Peak Max	V	175.00	79.00	74.00	-16.08	Pass
4193.05	41.00	5.99	11.39	58.38	Peak Max	H	128.00	292.00	74.00	-15.62	Pass
6358.19	44.81	7.96	10.22	62.98	Peak Max	V	185.00	280.00	74.00	-11.02	Pass
9656.18	41.03	12.16	7.43	60.63	Peak Max	H	155.00	360.00	74.00	-13.37	Pass
2065.64	30.52	3.59	11.27	45.37	Average Max	H	248.00	122.00	54.00	-8.63	Pass
1019.15	32.49	2.45	9.65	44.59	Average Max	V	175.00	79.00	54.00	-9.41	Pass
4193.05	27.12	5.99	11.39	44.50	Average Max	H	128.00	292.00	54.00	-9.50	Pass
6358.19	31.53	7.96	10.22	49.71	Average Max	V	185.00	280.00	54.00	-4.29	Pass
9656.18	27.73	12.16	7.43	47.32	Average Max	H	155.00	360.00	54.00	-6.68	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Cycle	Cal Due	In use
Conducted Emissions					
Spectrum Analyzer	N9010A	MY50210206	1 Year	08/13/2015	<input checked="" type="checkbox"/>
Signal Analyzer	FSIQ7	825555/013	1 Year	05/31/2016	<input checked="" type="checkbox"/>
V-LISN (150 kHz – 30 MHz)	NNLK 8129	8129-190	1 Year	08/11/2015	<input checked="" type="checkbox"/>
LISN (9 kHz – 30 MHz)	MN2050B	1018	1 Year	07/31/2015	<input checked="" type="checkbox"/>
TLISN	ISN T800	30814	1 Year	08/08/2015	<input checked="" type="checkbox"/>
Hygro Hermograph	ST-50	HE01-000092	1 Year	05/25/2016	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI Test Receiver	ESIB 40	100179	1 Year	05/24/2016	<input checked="" type="checkbox"/>
Antenna - Biconlog (30 MHz – 2 GHz)	JB1	A030702	1 Year	08/12/2015	<input checked="" type="checkbox"/>
DoubleRidged Waveguide Horn Antenna (1-18 GHz)	3115	10SL0059	1 Year	08/11/2015	<input checked="" type="checkbox"/>
Horn Antenna (18-40 GHz)	AH-840	101013	1 Year	08/11/2015	<input checked="" type="checkbox"/>
RF Pre-Amplifier	LPA-6-30	11140711	1 Year	02/19/2016	<input checked="" type="checkbox"/>
Microwave Preamplifier (18-40 GHz)	PA-840	181251	1 Year	02/19/2016	<input checked="" type="checkbox"/>
3 Meters SAC	3M	N/A	1 Year	08/29/2015	<input checked="" type="checkbox"/>
10 Meters SAC	10M	N/A	1 Year	09/05/2015	<input checked="" type="checkbox"/>
Hygro Hermograph	ST-50	HE01-000092	1 Year	05/25/2016	<input checked="" type="checkbox"/>
RF Conducted Measurement					
Spectrum Analyzer	N9010A	MY50210206	1 Year	8/13/2015	<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		Radio & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I , Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		(Phase II) OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		Radio: Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		<p>Radio: A1. Terminal equipment for purpose of calling</p> <p>Telecom: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law</p>
Korea CAB Accreditation		<p>EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI</p> <p>EMS: KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS</p> <p>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</p> <p>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</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>EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4</p> <p>Radio communications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771</p> <p>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</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