

RF TEST REPORT



Report No.: FCC_RF_SL14071801-RUC-010_DTS Rev1.2

Supersede Report No.: FCC_RF_SL14071801-RUC-010_DTS Rev1.1

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	Access Point
Model No.	:	R600
Test Standard	:	47 CFR 15.247: 2013
Test Method	:	ANSI C63.10: 2009 558074 D01 DTS Meas Guidance v03r02
FCC ID	:	S9GR600
IC ID	:	5912A-R600
Dates of test	:	August 26, 2014 to September 30, 2014
Issue Date	:	10/27/2014
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification ☒		
Equipment did not comply with the specification ☐		

This Test Report is Issued Under the Authority of:

	
Nima Molaei	David Zhang
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
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Laboratory Introduction

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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_RF_SL14071801-RUC-010_DTS	None	Original	09/30/2014
FCC_RF_SL14071801-RUC-010_DTS Rev1.0	Rev1.0	Update FCC ID and EUT info	10/17/2014
FCC_RF_SL14071801-RUC-010_DTS Rev1.1	Rev1.1	Update applicant information	10/24/2014
FCC_RF_SL14071801-RUC-010_DTS Rev1.2	Rev1.2	Update technical information	10/27/2014

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: Access Point
Model: R600

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	:	Ruckus Wireless, Inc.
Applicant Address	:	350 West Java Drive, Sunnyvale, California 94089 U.S.A
Manufacturer Name	:	Ruckus Wireless, Inc.
Manufacturer Address	:	350 West Java Drive, Sunnyvale, California 94089 U.S.A

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	:	Access Point
Model No.	:	R600
Trade Name	:	Ruckus
Serial No.	:	141406000029
Host Model No.	:	N/A
Input Power	:	48VDC (PoE) and 12 VDC (AC/DC Adapter)
Power Adapter Manu/Model	:	N/A
Power Adapter SN	:	N/A
Hardware version	:	N/A
Software version	:	N/A
Date of EUT received	:	08/10/2014
Equipment Class/ Category	:	DTS, UNII
Clock Frequencies	:	N/A
Port/Connectors	:	PoE, Ethernet, Console

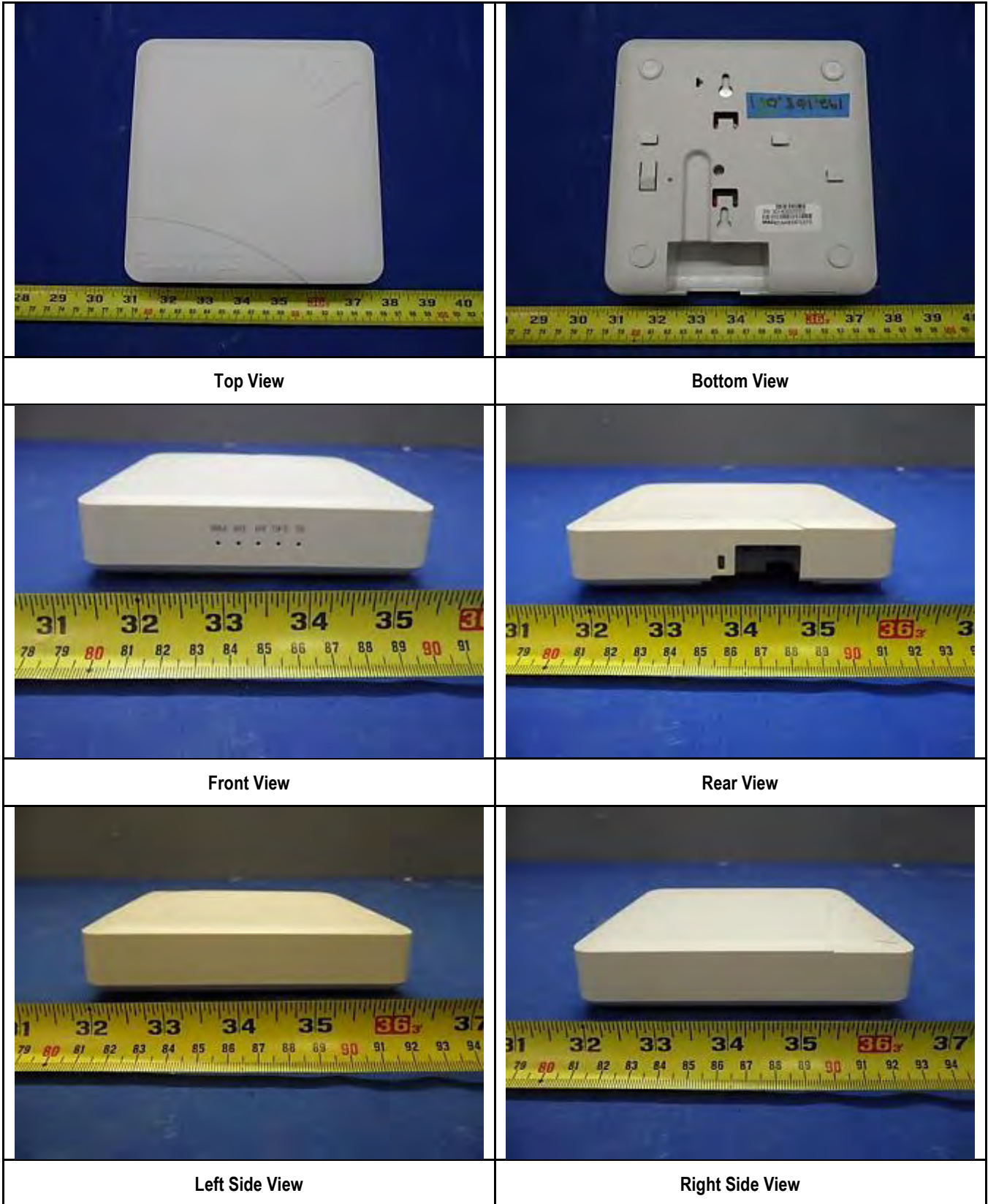
6.2 Radio Description

Radio Type	802.11b	802.11g	802.11a	802.11n-20M	802.11n-40M	802.11ac-80M
Operating Frequency	2412-2472MHz	2412-2472MHz	5180-5240MHz 5745-5825MHz	2412-2472MHz 5180-5240MHz 5745-5825MHz	2422-2462MHz 5190-5230MHz 5755-5795MHz	5210MHz 5775MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	20MHz	5MHz(2.4GHz), 20MHz (5GHz)	40MHz	80MHz
Number of Channels	13	13	9	11(2.4GH) 9 (5GHz)	9(2.4GH) 5(5GHz)	2
Antenna Type	Internal Patch Antenna					
Antenna Gain (Peak)	1 dBi (2.4GHz), 3 dBi (5 GHz)					
Antenna Connector Type	SMA					
Note	EUT has 3 antenna, 1 antenna is in horizontal polarity, and 2 antennas in vertical polarity. The 802.11b/g/a is in CDD mode with all 3 antenna transmit simultaneously. Since they're in 90 deg phase shift between the horizontal and vertical antenna, for radiated limit, the result from different polarization antenna will not be combined. So only the result for 2 vertical poparity antennas will be combined for MIMO mode. For cross-polarized antenna, the total gain—including array gain—is computed separately for each of the two (or three) polarizations using the procedures presented in this document. The highest of the total gains shall apply. For this case, the highest of the total gain will be the directional gain of 2 vertical antennas. For conducted limit like power and psd, the result from all 3 chains will be summed. For 802.11b/g/a mode under CDD mode, the array gain for power will be 0 and for PSD will be 10 log (Nant/Nss) dB to be calculated separately for horizontal and vertical polarity. Reference to the following KDB for clarification. 662911 D01 Multiple Transmitter Output v02r01 662911 D02 MIMO with Cross-Polarized Antennas v01					

EUT ART Power level setting

Mode	Frequency (MHz)	ART Power setting
802.11-b	2412	22
802.11-b	2437	22
802.11-b	2462	22
802.11-g	2412	22
802.11-g	2437	22
802.11-g	2462	22
802.11-n-20	2412	21
802.11-n-20	2437	22
802.11-n-20	2462	22
802.11-n-40	2422	18
802.11-n-40	2437	22
802.11-n-40	2452	22
802.11-a	5180	22
802.11-a	5220	22
802.11-a	5240	22
802.11-n-20	5180	20
802.11-n-20	5220	22
802.11-n-20	5240	22
802.11-n-40	5190	16.5
802.11-n-40	5230	22
802.11-ac-80	5210	14
802.11-a	5745	22
802.11-a	5785	22
802.11-a	5825	22
802.11-n-20	5745	22
802.11-n-20	5785	22
802.11-n-20	5825	22
802.11-n-40	5755	22
802.11-n-40	5795	22
802.11-ac-80	5775	22

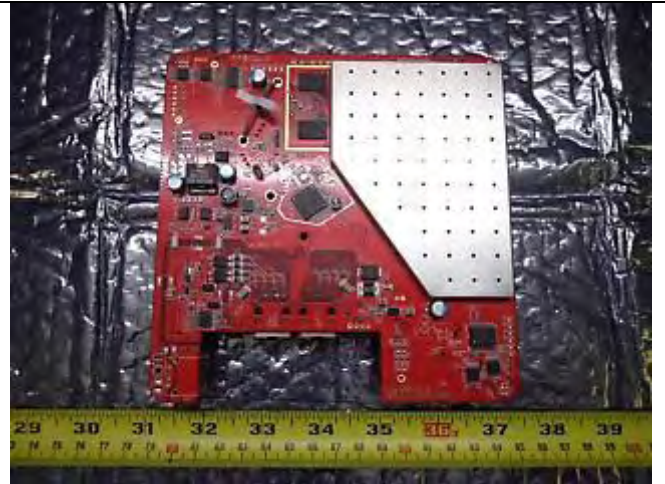
6.3 EUT Photos - External



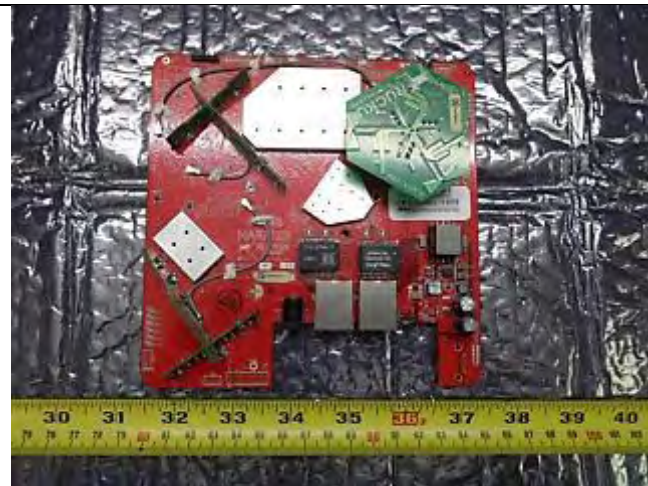
6.4 EUT Photos - Internal



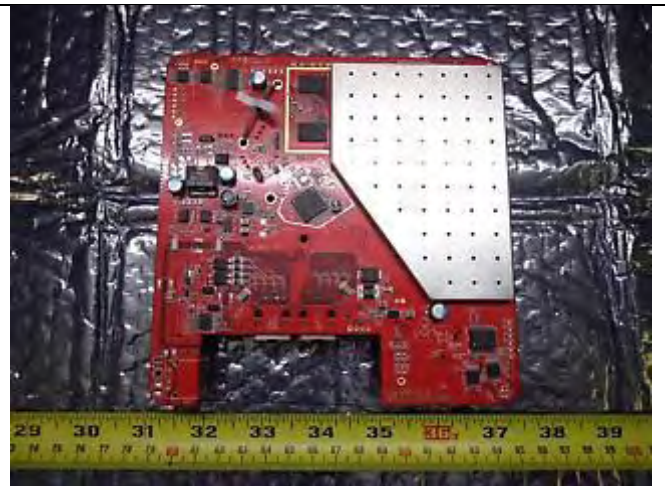
Main PCBA Board Top View



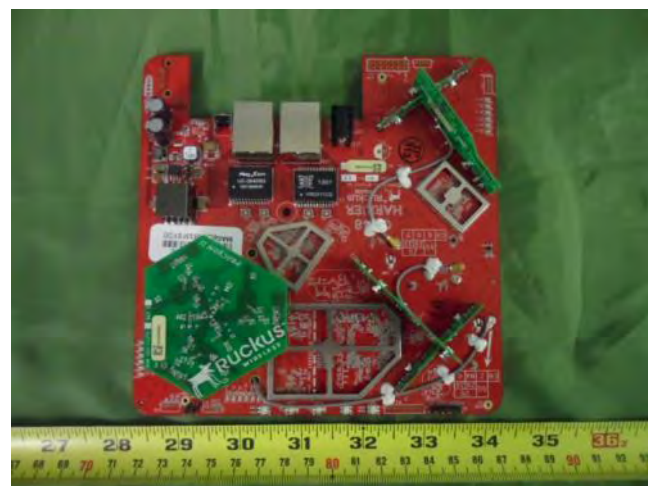
Main PCBA Board Bottom View



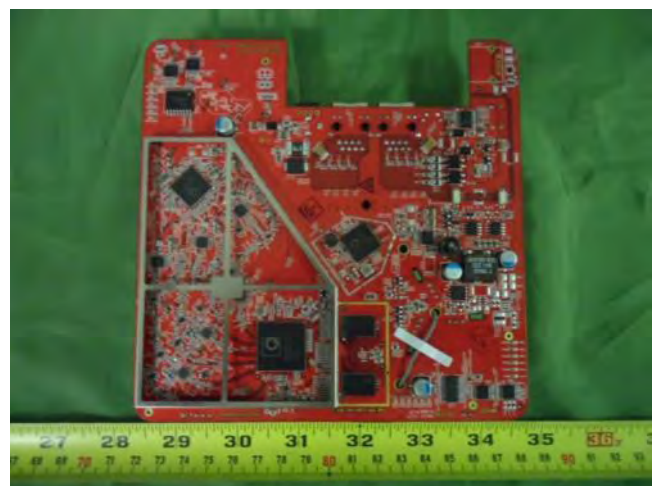
Main PCBA Board Top View



Main PCBA Board Bottom View



Main PCBA Board-without shielding Top View



Main PCBA Board-without shielding Bottom View

6.5 EUT Test Setup Photos



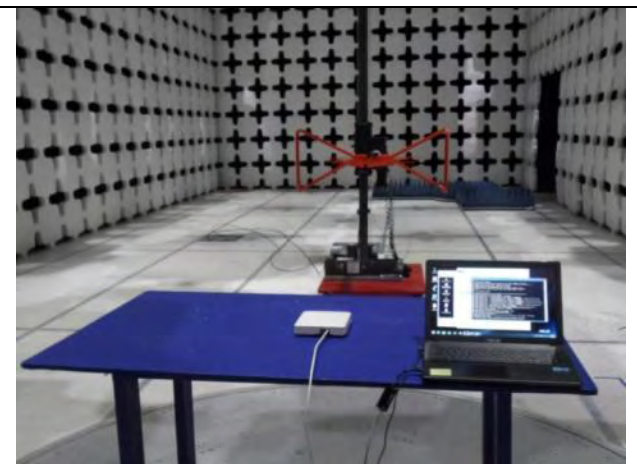
AC Line Conducted Emissions – Front View



AC Line Conducted Emissions – Rear View



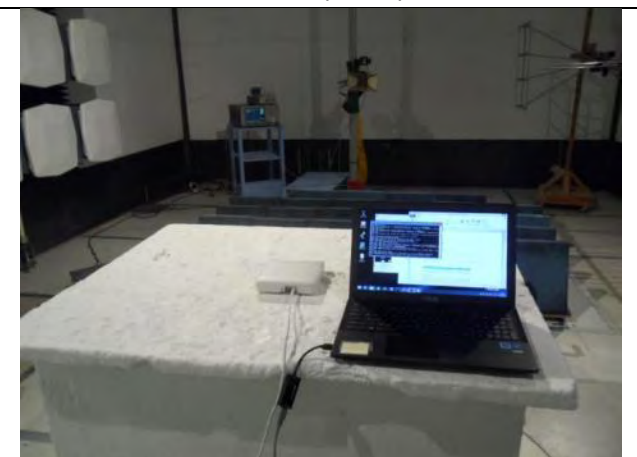
Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View



Radiated Emissions (>18GHz) – Front View



Radiated Emissions (>18GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	PP01L Latitude C610	CN-06P823-48643-37P-4153	Dell	-
2	EUT power Supply	HK-AD-120A100-US	740-64190-011	Ruckus	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
-	-	-	-	-	-	-	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Command Line in windows	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 – 2009 558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.10 – 2009	☒ Pass ☐ N/A

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Channel Separation	FCC	15.247 (a)(1)	FCC	-	☐ Pass ☒ N/A
6 dB Bandwidth	FCC	15.247(a)(2)	FCC	558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
Number of Hopping Channels	FCC	15.247(a)(1)	FCC	-	☐ Pass ☒ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	ANSI C63.10 – 2009 558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
Time of Occupancy	FCC	15.247(a)(1)	FCC	-	☐ Pass ☒ N/A
Output Power	FCC	15.247(b)	FCC	558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
Receiver Spurious Emissions	FCC	15.247(d)	FCC	-	☐ Pass ☒ N/A
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	-	☐ Pass ☒ N/A
Power Spectral Density	FCC	15.247(e)	FCC	558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
Hybrid System Requirement	FCC	15.247(f)	FCC	-	☐ Pass ☒ N/A
Hopping Capability	FCC	15.247(g)	FCC	-	☐ Pass ☒ N/A
Hopping Coordination Requirement	FCC	15.247(h)	FCC	-	☐ Pass ☒ N/A
RF Exposure requirement	FCC	15.247(i)	FCC	-	☐ Pass ☒ N/A
Remark	- All measurement uncertainties do not take into consideration for all presented test results. - 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

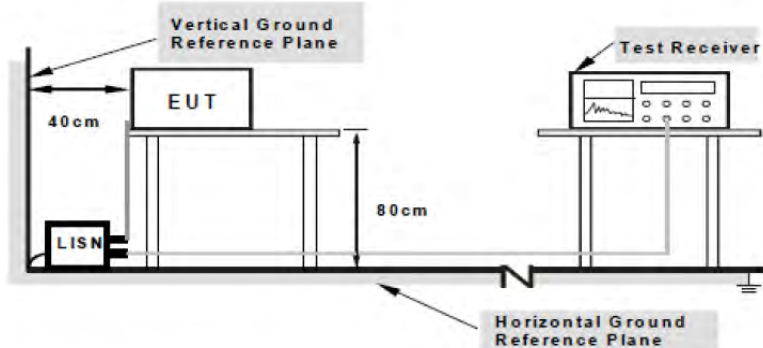
Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious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

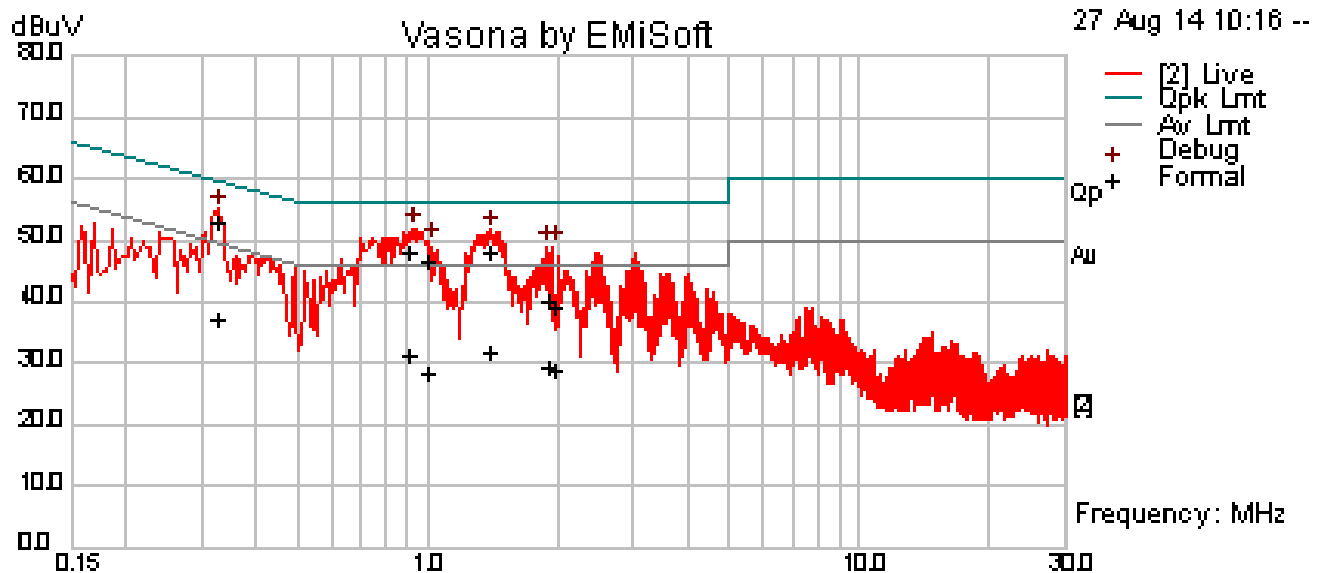
Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, 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.	☒
Test Setup	 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.		
Procedure	- 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 tested with AC 110V 60Hz		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Conducted Emission Test Results (Live)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	22	Result:	☒ Pass ☐ Fail
	Humidity (%):	40		
	Atmospheric(mbar):	1022		
Mains Power:	120Vac, 60Hz			
Tested by:	George Arias			
Test Date:	08/27/2014			
Remarks	N/A			

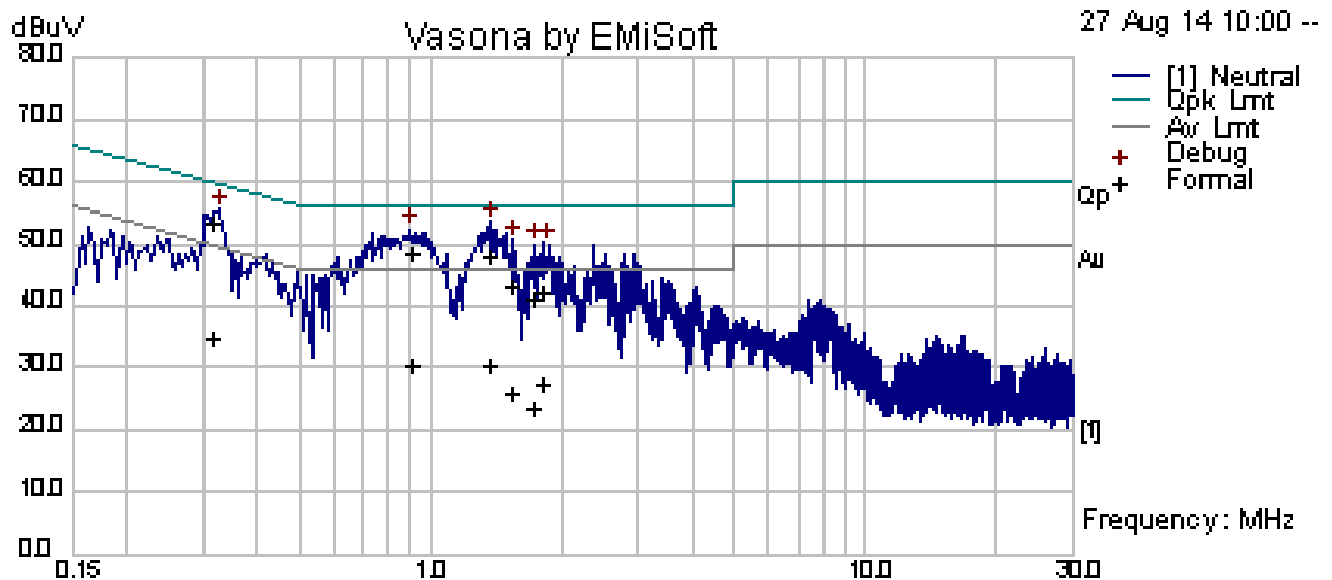


Live Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.32	42.42	10.01	0.71	53.13	Quasi Peak	Live	59.59	-6.46	Pass
0.90	37.40	10.01	0.77	48.19	Quasi Peak	Live	56.00	-7.81	Pass
0.99	35.60	10.02	0.78	46.4	Quasi Peak	Live	56.00	-9.60	Pass
1.40	36.95	10.02	0.85	47.83	Quasi Peak	Live	56.00	-8.17	Pass
1.90	29.11	10.02	0.93	40.06	Quasi Peak	Live	56.00	-15.94	Pass
1.96	28.17	10.02	0.94	39.13	Quasi Peak	Live	56.00	-16.87	Pass
0.32	26.32	10.01	0.71	37.04	Average	Live	49.59	-12.55	Pass
0.90	20.41	10.01	0.77	31.20	Average	Live	46.00	-14.80	Pass
0.99	17.54	10.02	0.78	28.33	Average	Live	46.00	-17.67	Pass
1.40	21.03	10.02	0.85	31.9	Average	Live	46.00	-14.10	Pass
1.90	18.60	10.02	0.93	29.56	Average	Live	46.00	-16.44	Pass
1.96	18.04	10.02	0.94	29.00	Average	Live	46.00	-17.00	Pass

Conducted Emission Test Results (Neutral)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	22	Result:	☒ Pass ☐ Fail
	Humidity (%):	40		
	Atmospheric(mbar):	1022		
Mains Power:	120Vac, 60Hz			
Tested by:	George Arias			
Test Date:	08/27/2014			
Remarks	N/A			



Neutral Line@ 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.31	42.57	10.00	0.71	53.29	Quasi Peak	Neutral	59.87	-6.59	Pass
0.90	37.72	10.01	0.77	48.51	Quasi Peak	Neutral	56.00	-7.49	Pass
1.36	37.21	10.02	0.85	48.08	Quasi Peak	Neutral	56.00	-7.92	Pass
1.54	32.39	10.02	0.88	43.29	Quasi Peak	Neutral	56.00	-12.71	Pass
1.74	30.13	10.02	0.91	41.06	Quasi Peak	Neutral	56.00	-14.94	Pass
1.82	31.10	10.02	0.92	42.04	Quasi Peak	Neutral	56.00	-13.96	Pass
0.31	23.97	10.00	0.71	34.68	Average	Neutral	49.87	-15.19	Pass
0.90	19.47	10.01	0.77	30.26	Average	Neutral	46.00	-15.74	Pass
1.36	19.55	10.02	0.85	30.42	Average	Neutral	46.00	-15.58	Pass
1.54	15.35	10.02	0.88	26.25	Average	Neutral	46.00	-19.75	Pass
1.74	12.58	10.02	0.91	23.51	Average	Neutral	46.00	-22.49	Pass
1.82	16.64	10.02	0.92	27.58	Average	Neutral	46.00	-18.42	Pass

Note: The results above show only the worst case.

10.2 6dB Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	a)(2)	6dB BW≥500KHz;	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r02, 8.1 DTS bandwidth <u>6dB Emission bandwidth measurement procedure</u> - Set RBW = 100 kHz. - Set the video bandwidth (VBW) $\geq 3 \times$ RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. - Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.		
Test Date	9/23/2014	Environmental condition	Temperature 23°C Relative Humidity 42% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
6 dB DTS Bandwidth	100KHz	3 x RBW	>EBW	PK	Auto	Max hold	-

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

6dB Bandwidth measurement result for 2.4GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	802.11b	2412	Low	6.035	≥0.5	Pass
6dB BW	802.11b	2437	Mid	6.000	≥0.5	Pass
6dB BW	802.11b	2462	High	6.540	≥0.5	Pass
6dB BW	802.11g	2412	Low	16.52	≥0.5	Pass
6dB BW	802.11g	2437	Mid	16.56	≥0.5	Pass
6dB BW	802.11g	2462	High	16.49	≥0.5	Pass
6dB BW	802.11n-20M	2412	Low	17.79	≥0.5	Pass
6dB BW	802.11n-20M	2437	Mid	17.78	≥0.5	Pass
6dB BW	802.11n-20M	2462	High	17.78	≥0.5	Pass
6dB BW	802.11n-40M	2422	Low	36.51	≥0.5	Pass
6dB BW	802.11n-40M	2437	Mid	36.48	≥0.5	Pass
6dB BW	802.11n-40M	2452	High	36.46	≥0.5	Pass

6dB Bandwidth Test Plots



6dB BW -2.4G 802.11b 2412MHz



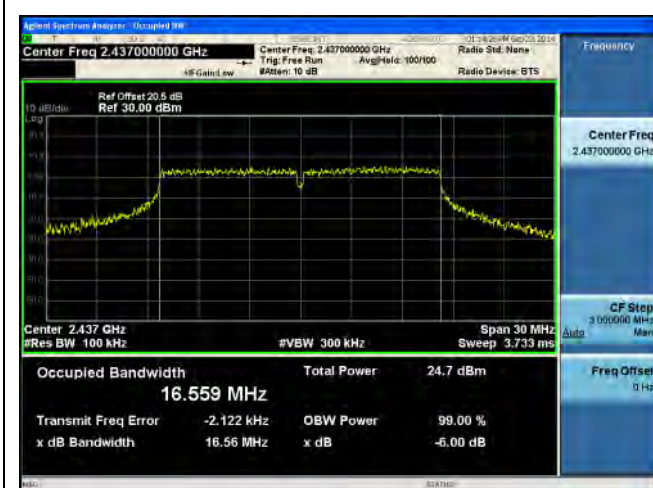
6dB BW -2.4G 802.11b 2437MHz



6dB BW -2.4G 802.11b 2462MHz



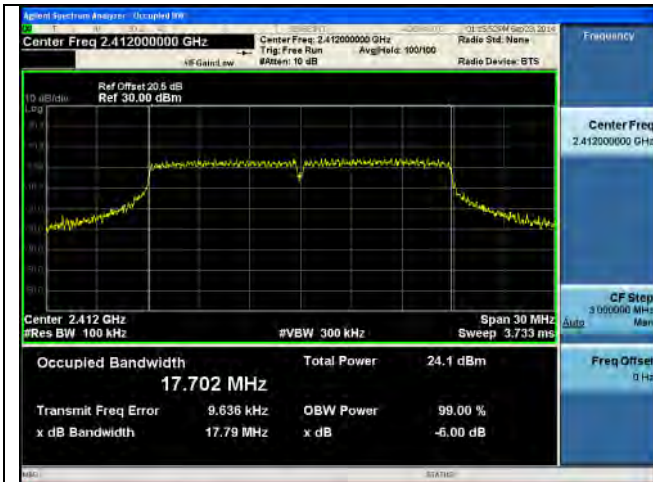
6dB BW -2.4G 802.11g 2412MHz



6dB BW -2.4G 802.11g 2437MHz



6dB BW -2.4G 802.11g 2462MHz



6dB BW -2.4G 802.11n-20M 2412MHz



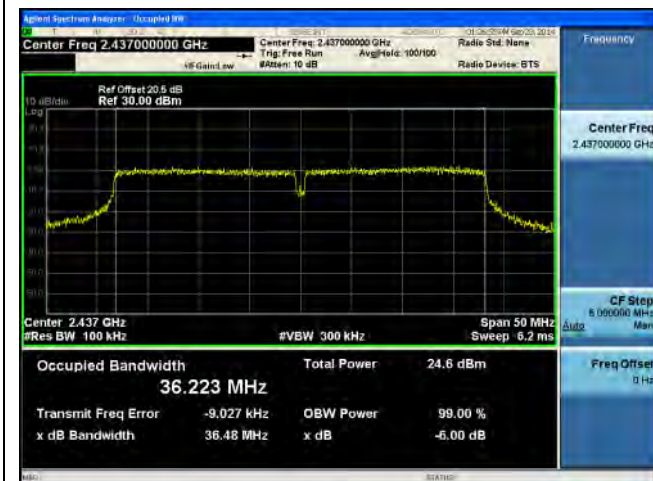
6dB BW -2.4G 802.11n-20M 2437MHz



6dB BW -2.4G 802.11n-20M 2462MHz



6dB BW -2.4G 802.11n-40M 2422MHz



6dB BW -2.4G 802.11n-40M 2437MHz



6dB BW -2.4G 802.11n-40M 2452MHz

10.3 Peak Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & < 50 channels: ≤ 0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤ 1 Watt	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r02, 9.2.2.2 <u>Maximum output power measurement procedure</u> - Set the RBW = 1-5% of the OBW, not to exceed 1 MHz - Set the VBW $\geq 3 \times$ RBW - Set the span $\geq 1.5 \times$ OBW - Detector = RMS - Sweep time = auto couple. - Trace mode = Trace average - Allow trace to fully stabilize. - Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges.		
Test Date	08/18/2014	Environmental condition	Temperature 23°C Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark			
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
PK output power	1MHz	$\geq 3 \times$ RBW	$\geq 1.5 \times$ OBW	RMS	Auto	Trace average	-

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Output Power measurement result

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)				Limit (dBm)	Result
				Chain 0	Chain1	Chain2	Combined Power		
Output power	802.11b	2412	Low	21.0	20.6	20.6	25.5	30	Pass
Output power	802.11b	2437	Mid	18.7	19.0	19.1	23.7	30	Pass
Output power	802.11b	2462	High	19.1	18.5	18.3	23.4	30	Pass
Output power	802.11g	2412	Low	19.0	18.9	19.3	23.8	30	Pass
Output power	802.11g	2437	Mid	18.1	18.5	18.4	23.1	30	Pass
Output power	802.11g	2462	High	18.2	17.8	18.1	22.8	30	Pass
Output power	802.11n-20M	2412	Low	18.5	18.4	18.6	23.3	30	Pass
Output power	802.11n-20M	2437	Mid	18.2	18.7	18.7	23.3	30	Pass
Output power	802.11n-20M	2462	High	18.5	17.9	18.0	22.9	30	Pass
Output power	802.11n-40M	2422	Low	16.2	15.4	15.9	20.6	30	Pass
Output power	802.11n-40M	2437	Mid	19.0	18.6	18.5	23.5	30	Pass
Output power	802.11n-40M	2452	High	17.7	18.3	18.2	22.8	30	Pass
Note	Per KDB 662911 D01 Multiple Transmitter Output v02r01, the direction gain for horizontal polarization and vertical polarization is calculated separately. For 2.4GHz horizontal polarization (1 chain), antenna gain = 1 dBi, directional gain = 0, total gain = 1 dBi For 2.4Ghz veritcal polarization (2 chains), antenna gain = 1 dBi, directional gain = 3 dB, total gain = 4 dBi Highest of totoal gain is 4 dBi.								

10.4 Band Edge

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	d)	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 ☐ 20 dB down ☒ 30 dB down	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r02 <u>Band Edge measurement procedure</u> 1. Set the EUT to maximum power setting and enable the EUT transmit continuously. 2. Band edge emissions must be at least 30 dB down from the highest emission level within the authorized band as a measured. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used. 3. Change modulation and channel bandwidth then repeat step 1 to 2. 4. Measured and record the results in the test report.		
Test Date	09/29/2014	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
Band Edge	100KHz	≥3 x RBW	135 MHz	RMS	Auto	Trace average	-

Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Plots



Band Edge-2.4G-802.11b Low-Chain0



Band Edge-2.4G-802.11b Low-Chain1



Band Edge-2.4G-802.11b Low-Chain2



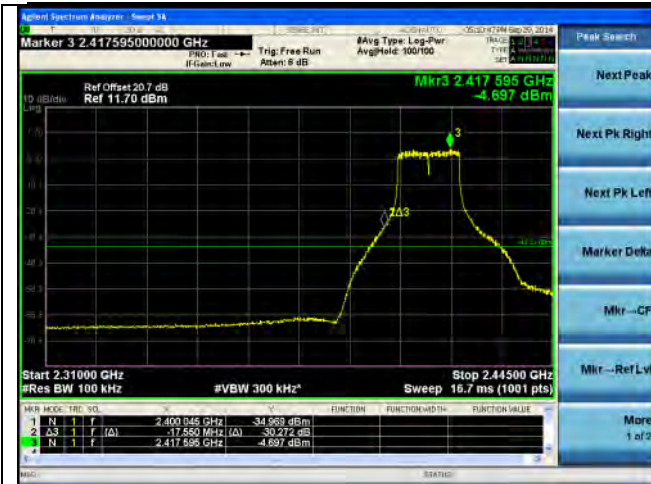
Band Edge-2.4G-802.11b High-Chain0



Band Edge-2.4G-802.11b High-Chain1



Band Edge-2.4G-802.11b High-Chain2



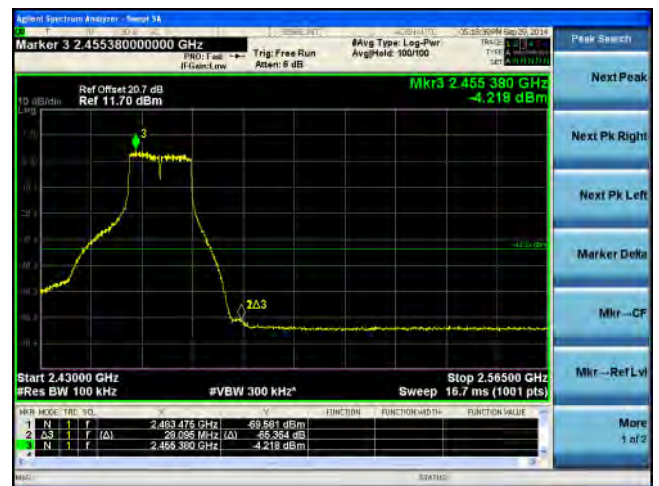
Band Edge-2.4G-802.11g Low-Chain0



Band Edge-2.4G-802.11g Low-Chain1



Band Edge-2.4G-802.11g Low-Chain2



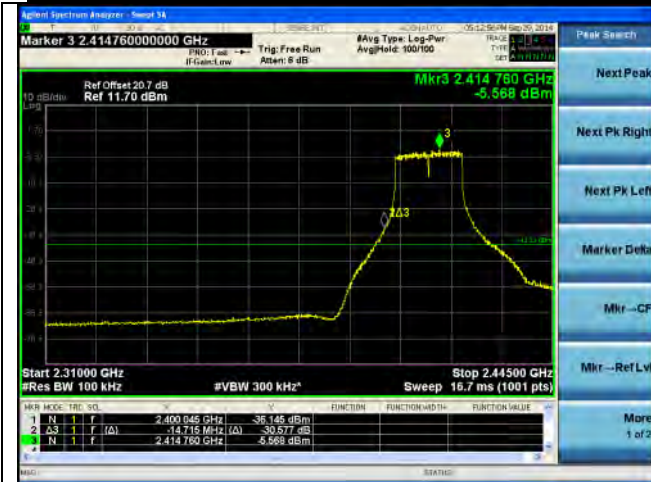
Band Edge-2.4G-802.11g High-Chain0



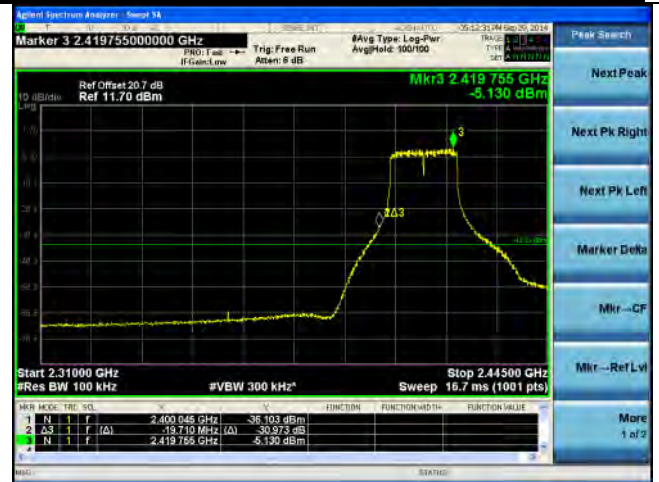
Band Edge-2.4G-802.11g High-Chain1



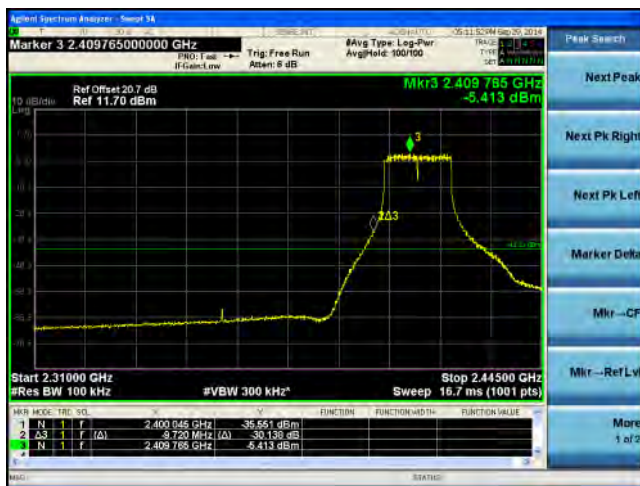
Band Edge-2.4G-802.11g High-Chain2



Band Edge-2.4G-802.11n-20M Low-Chain0



Band Edge-2.4G-802.11n-20M Low-Chain1



Band Edge-2.4G-802.11n-20M Low-Chain2



Band Edge-2.4G-802.11n-20M High-Chain0



Band Edge-2.4G-802.11n-20M High-Chain1



Band Edge-2.4G-802.11n-20M High-Chain2



Band Edge-2.4G-802.11n-40M Low-Chain0



Band Edge-2.4G-802.11n-40M Low-Chain1



Band Edge-2.4G-802.11n-40M Low-Chain2



Band Edge-2.4G-802.11n-40M High-Chain0



Band Edge-2.4G-802.11n-40M High-Chain1



Band Edge-2.4G-802.11n-40M High-Chain2

10.5 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(e)	e)	DSSS: ≤8dBm/3KHz	☒
	f)	DSSS in hybrid sys with FH turned off: ≤8dBm/3KHz	☐
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r02, 10.3 Method AVGPS-1 <u>Peak spectral density measurement procedure</u> - Set analyzer center frequency to DTS channel center frequency. - Set the span to 1.5 times the DTS bandwidth. - Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. - Set the VBW ≥ 3 x RBW. - Detector = RMS - Sweep time = auto couple. - Trace mode = Trace average over 100 traces - Allow trace to fully stabilize. - Use the peak marker function to determine the maximum amplitude level within the RBW. - If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Test Date	09/23/2014	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
PSD	100KHz	≥3x RBW	1.5x DTS BW	RMS	Auto	Trace average	-

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

PSD measurement result

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/100KHz)				Limit (dBm/3KHz)	Result
				Chain0	Chain1	Chain2	Combined PSD		
PSD	802.11b	2412	Low	2.237	1.952	2.242	6.917	≤8	Pass
PSD	802.11b	2437	Mid	3.188	3.070	3.154	7.909	≤8	Pass
PSD	802.11b	2462	High	2.405	2.475	2.411	7.202	≤8	Pass
PSD	802.11g	2412	Low	-1.658	-1.500	-1.809	3.117	≤8	Pass
PSD	802.11g	2437	Mid	-0.651	-0.419	-0.664	4.195	≤8	Pass
PSD	802.11g	2462	High	-1.227	-1.294	-1.026	3.590	≤8	Pass
PSD	802.11n-20M	2412	Low	-2.867	-2.491	-2.453	2.172	≤8	Pass
PSD	802.11n-20M	2437	Mid	-1.323	-1.115	-0.913	3.657	≤8	Pass
PSD	802.11n-20M	2462	High	-1.094	-1.678	-1.635	3.310	≤8	Pass
PSD	802.11n-40M	2422	Low	-7.043	-7.021	-6.758	-2.168	≤8	Pass
PSD	802.11n-40M	2437	Mid	-3.916	-4.176	-3.922	0.768	≤8	Pass
PSD	802.11n-40M	2452	High	-4.947	-4.720	-4.883	-0.078	≤8	Pass
Note	Per KDB 662911 D01 Multiple Transmitter Output v02r01, the direction gain for horizontal polarization and vertical polarization is calculated separately. For 2.4GHz horizontal polarization (1 chain), antenna gain = 1 dBi, directional gain = 0, total gain = 1 dBi For 2.4Ghz vertical polarization (2 chains), antenna gain = 1 dBi, directional gain = 3 dB, total gain = 4 dBi Highest of total gain is 4 dBi.								

Test Plots



PSD-2.4G-802.11b Low-chain0



PSD-2.4G-802.11b Low-chain1



PSD-2.4G-802.11b Low-chain2



PSD-2.4G-802.11b Mid-chain0



PSD-2.4G-802.11b Mid-chain1



PSD-2.4G-802.11b Mid-chain2



PSD-2.4G-802.11b High-chain0



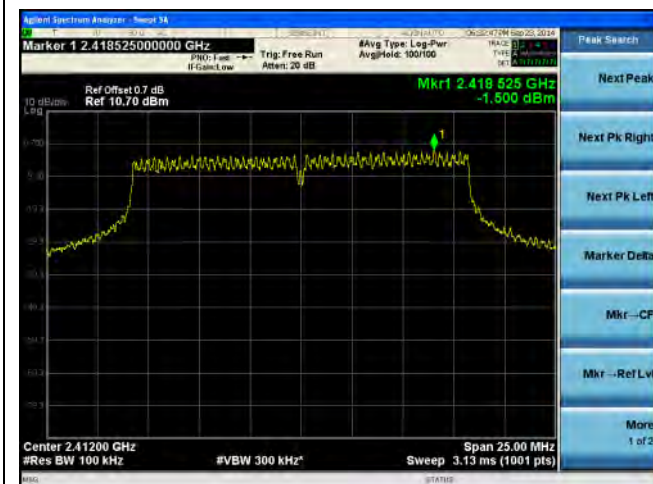
PSD-2.4G-802.11b High-chain1



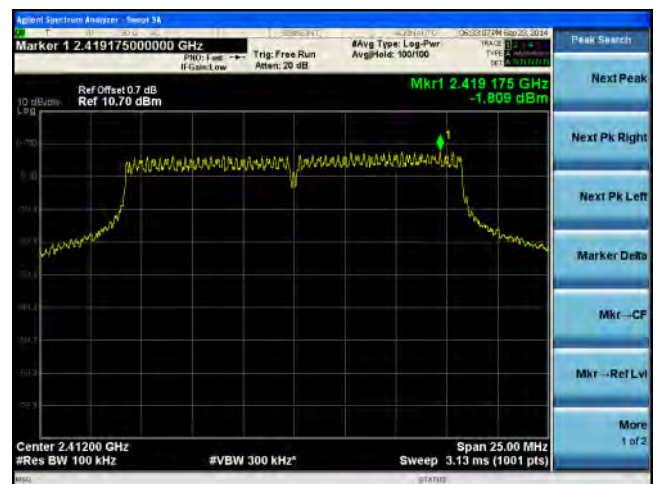
PSD-2.4G-802.11b High-chain2



PSD-2.4G-802.11g Low-chain0



PSD-2.4G-802.11g Low-chain1



PSD-2.4G-802.11g Low-chain2



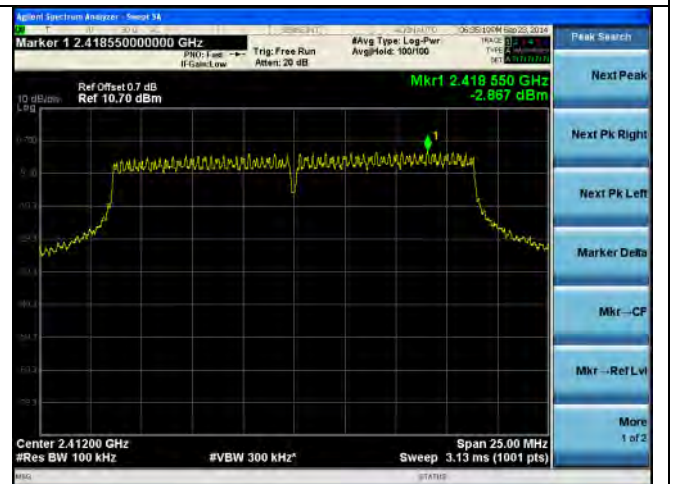
PSD-2.4G-802.11g High-chain0



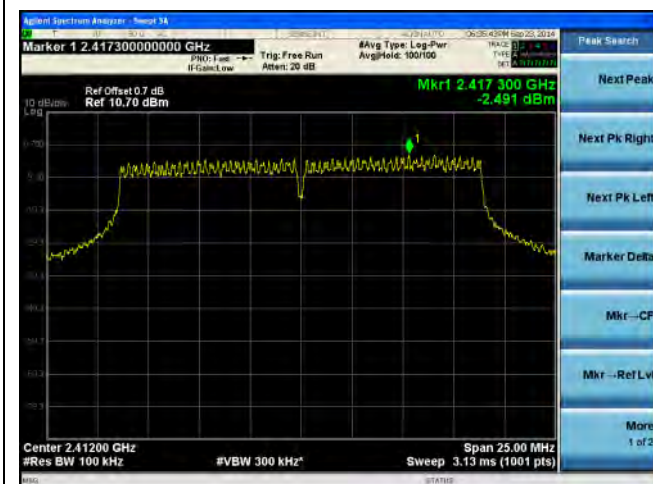
PSD-2.4G-802.11g High-chain1



PSD-2.4G-802.11g High-chain2



PSD-2.4G-802.11n-20M Low-chain0



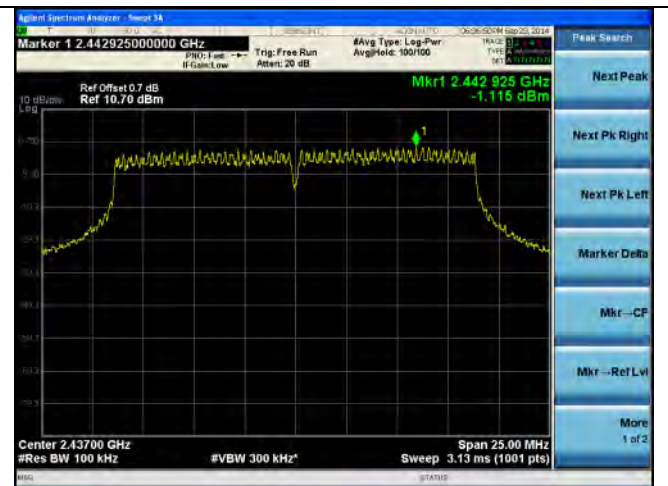
PSD-2.4G-802.11n-20M Low-chain1



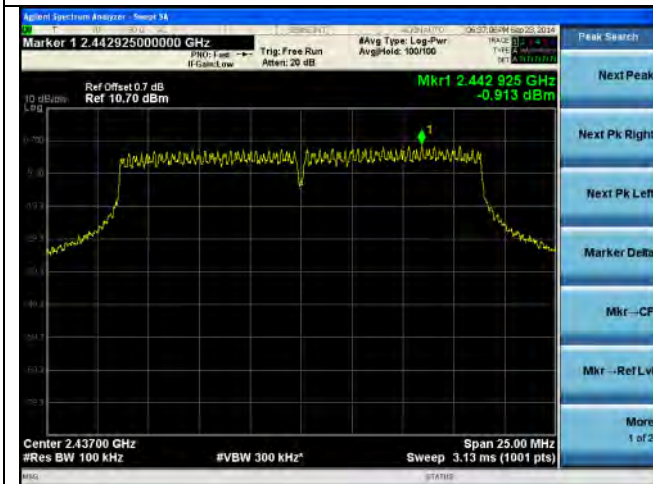
PSD-2.4G-802.11n-20M Low-chain2



PSD-2.4G-802.11n-20M Mid-chain0



PSD-2.4G-802.11n-20M Mid-chain1



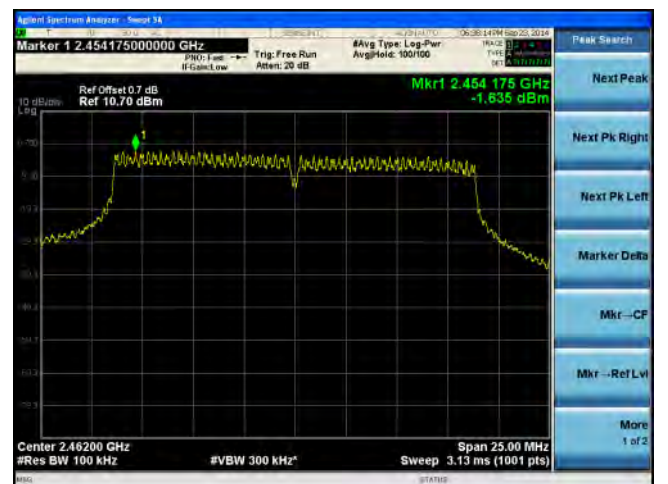
PSD-2.4G-802.11n-20M Mid-chain2



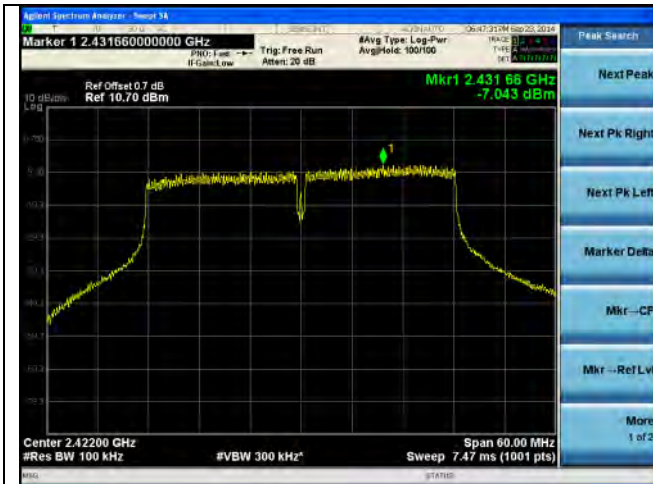
PSD-2.4G-802.11n-20M High-chain0



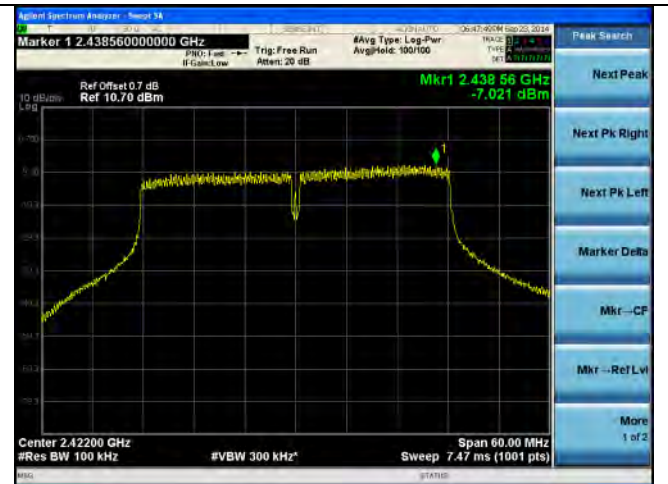
PSD-2.4G-802.11n-20M High-chain1



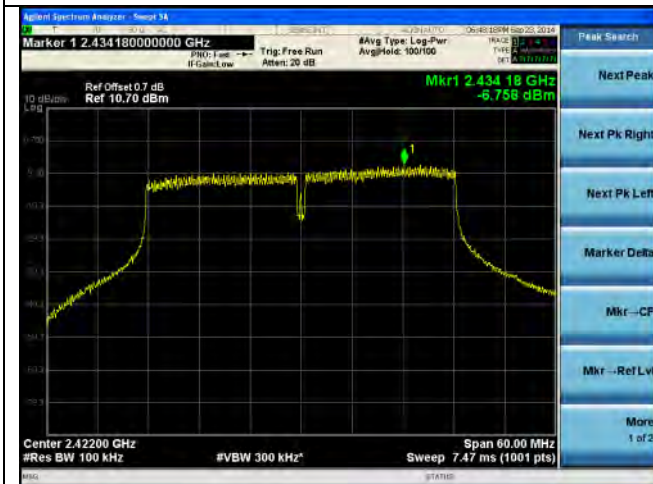
PSD-2.4G-802.11n-20M High-chain2



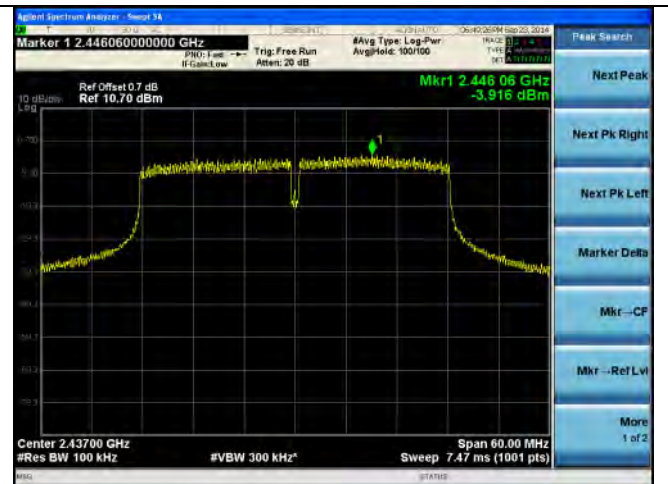
PSD-2.4G-802.11n-40M Low-chain0



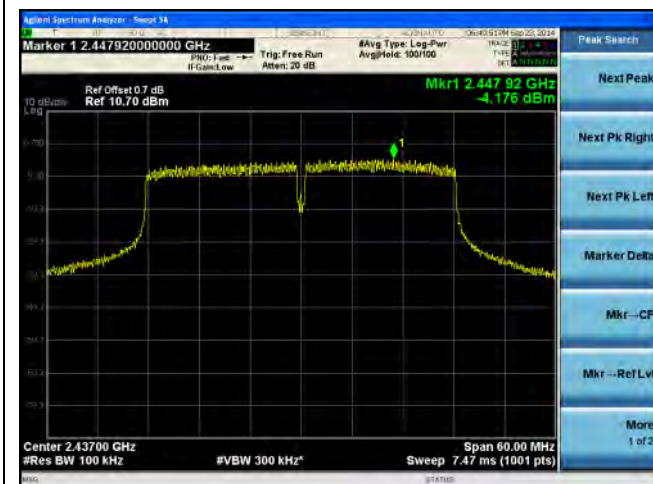
PSD-2.4G-802.11n-40M Low-chain1



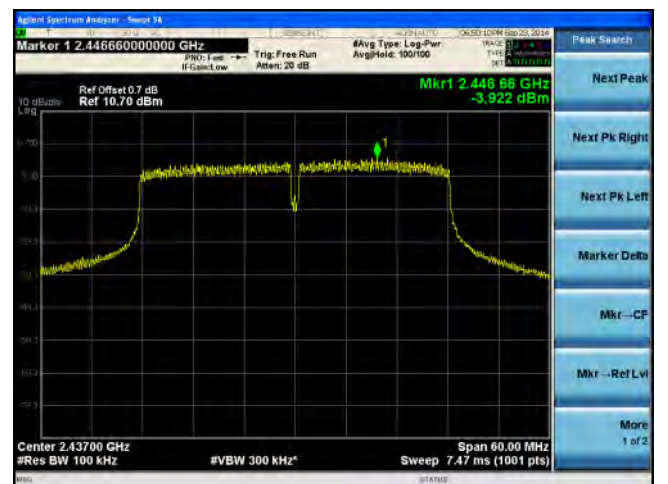
PSD-2.4G-802.11n-40M Low-chain2



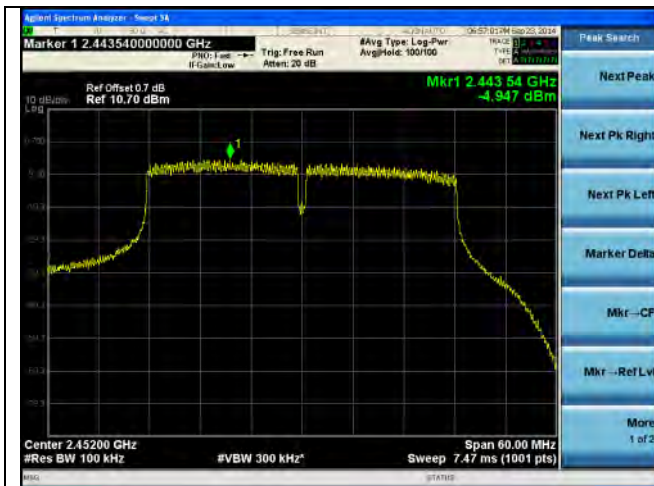
PSD-2.4G-802.11n-40M Mid-chain0



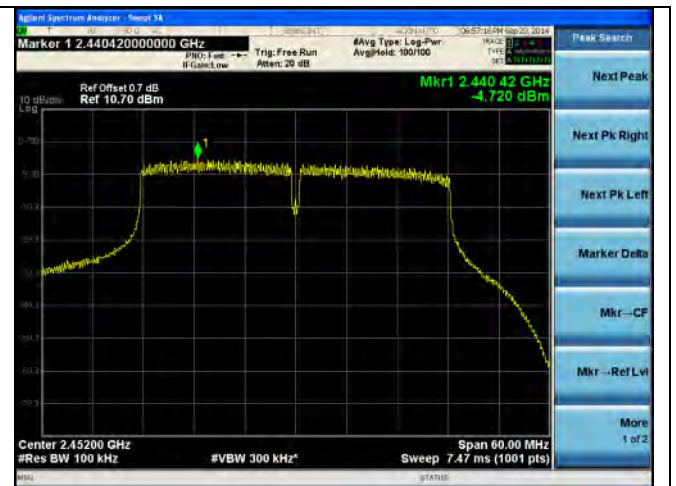
PSD-2.4G-802.11n-40M Mid-chain1



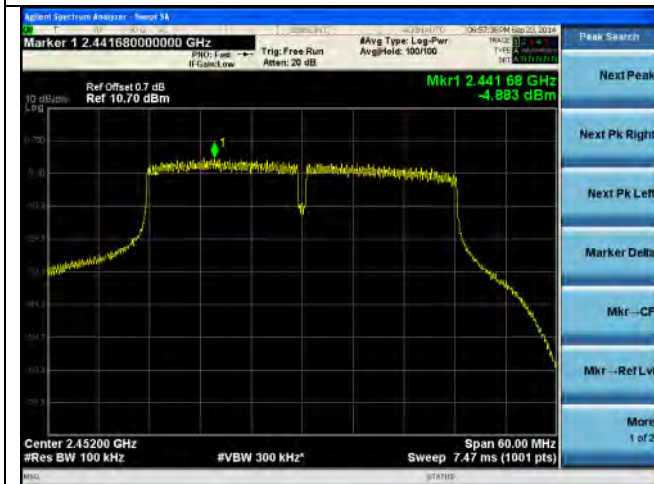
PSD-2.4G-802.11n-40M Mid-chain2



PSD-2.4G-802.11n-40M High-chain0



PSD-2.4G-802.11n-40M High-chain1



PSD-2.4G-802.11n-40M High-chain2

10.6 Conducted Spurious Emissions in non-restricted band

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	-	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 ☐ 20 dB down ☒ 30 dB down	☒
Test Setup			
Procedure	558074 D01 DTS Meas Guidance v03r02 <u>Conducted Spurious Emissions measurement procedure</u> - The RF output of EUT was conducted to the spectrum analyser by RF cable and attenuator. - Set the maximum power setting and enable the EUT transmit continusly. - RBW=100 KHz, VBW=300 KHz and Peak Detector. Unwanted emissions measured in any 100 KHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in band peak PSD level in 100 KHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247 - Measure and record the results in the test report. - The RF fundamental frequency should be excluded against the limit line in the operaiting frequency band.		
Test Date	08/21/2014-09/30/2014	Environmental condition	Temperature 24°C Relative Humidity 47% Atmospheric Pressure 1020mbar
Remark	Conducted Spurious Emission Limit (dBm) = Fundamental peak (dBm) – 30 dB Note: Fundamental peak is derived from the test trace and the spurious emission is calculated accordingly.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

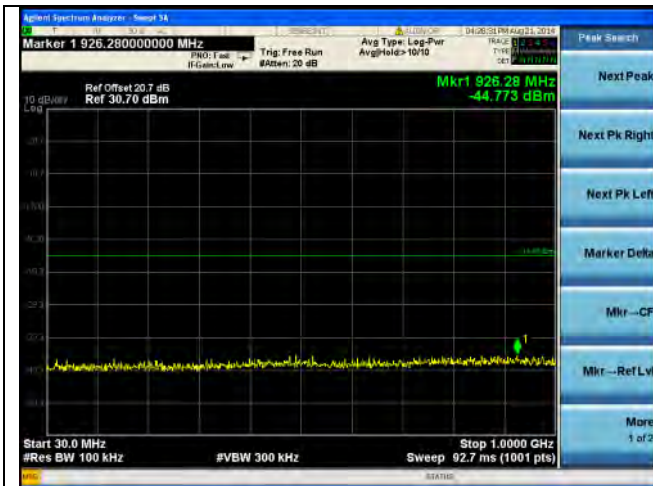
Test Plot ☒ Yes (See below) ☐ N/A

- **Conducted Spurious Emissions for non-restricted band**

Type	Test mode	Frequency Range (MHz)	Freq (MHz)	Level(dBm)	Limit (dBm)	Result
WLAN	802.11b-Low CH-Chain 0	30 -1000	926.28	-44.773	-14.4	Pass
		1000 - 26500	25735	-17.280	-14.4	Pass
WLAN	802.11b-Mid CH-Chain 0	30 -1000	805.03	-43.254	-14.6	Pass
		1000 - 26500	24639	-15.825	-14.6	Pass
WLAN	802.11b-High CH-Chain 0	30 -1000	540.22	-44.975	-14.1	Pass
		1000 - 26500	25200	-15.182	-14.1	Pass
WLAN	802.11b-Low CH-Chain 1	30 -1000	906.88	-43.573	-14.1	Pass
		1000 - 26500	24639	-16.85	-14.1	Pass
WLAN	802.11b-Mid CH-Chain 1	30 -1000	919.49	-44.053	-13.6	Pass
		1000 - 26500	24715	-16.768	-13.6	Pass
WLAN	802.11b-High CH-Chain 1	30 -1000	512.09	-44.115	-13.5	Pass
		1000 - 26500	25251	-16.704	-13.5	Pass
WLAN	802.11b-Low CH-Chain 2	30 -1000	891.36	-43.451	-14.4	Pass
		1000 - 26500	24.715	-17.159	-14.4	Pass
WLAN	802.11b-Mid CH-Chain 2	30 -1000	823.46	-44.183	-15.1	Pass
		1000 - 26500	24664	-17.085	-15.1	Pass
WLAN	802.11b-High CH-Chain 2	30 -1000	744.89	-43.904	-15.4	Pass
		1000 - 26500	24639	-17.65	-15.4	Pass
WLAN	802.11g-Low CH-Chain 0	30 -1000	402.48	-43.965	-14.0	Pass
		1000 - 26500	25276	-16.945	-14.0	Pass
WLAN	802.11g-Mid CH-Chain 0	30 -1000	933.07	-44.609	-14.2	Pass
		1000 - 26500	24715	-16.883	-14.2	Pass
WLAN	802.11g-High CH-Chain 0	30 -1000	878.75	-44.118	-13.6	Pass
		1000 - 26500	25174	-17.632	-13.6	Pass
WLAN	802.11g-Low CH-Chain 1	30 -1000	803.09	-43.694	-14.4	Pass
		1000 - 26500	25710	-16.982	-14.4	Pass
WLAN	802.11b-Mid CH-Chain 1	30 -1000	851.59	-43.924	-14.8	Pass
		1000 - 26500	25174	-16.723	-14.8	Pass
WLAN	802.11g-High CH-Chain 1	30 -1000	773.02	-43.936	-14.7	Pass
		1000 - 26500	24715	-17.265	-14.7	Pass
WLAN	802.11g-Low CH-Chain 2	30 -1000	819.58	-43.687	-14.3	Pass
		1000 - 26500	25251	-17.517	-14.3	Pass
WLAN	802.11g-Mid CH-Chain 2	30 -1000	907.85	-43.941	-15.1	Pass
		1000 - 26500	24715	-16.400	-15.1	Pass
WLAN	802.11g-High CH-Chain 2	30 -1000	961.2	-44.875	-14.4	Pass
		1000 - 26500	25174	-17.434	-14.4	Pass

Type	Test mode	Frequency Range (MHz)	Freq (MHz)	Level(dBm)	Limit (dBm)	Result
WLAN	802.11n-20M-Low CH-Chain 0	30 -1000	496.57	-43.696	-15.5	Pass
		1000 - 26500	25149	-17.047	-15.5	Pass
WLAN	802.11n-20M-Mid CH-Chain 0	30 -1000	549.92	-44.648	-16.0	Pass
		1000 - 26500	24715	-16.666	-16.0	Pass
WLAN	802.11n-20M-High CH-Chain 0	30 -1000	838.98	-43.871	-15.7	Pass
		1000 - 26500	24715	-16.392	-15.7	Pass
WLAN	802.11n-20M-Low CH-Chain 1	30 -1000	883.6	-44.428	-15.7	Pass
		1000 - 26500	25149	-17.047	-15.7	Pass
WLAN	802.11n-20M-Mid CH-Chain 1	30 -1000	676.99	-45.194	-14.7	Pass
		1000 - 26500	24741	-17.333	-14.7	Pass
WLAN	802.11n-20M-High CH-Chain 1	30 -1000	785.63	-43.71	-14.9	Pass
		1000 - 26500	25123	-17.056	-14.9	Pass
WLAN	802.11n-20M-Low CH-Chain 2	30 -1000	765.26	-44.774	-14.6	Pass
		1000 - 26500	24741	-17.169	-14.6	Pass
WLAN	802.11n-20M-Mid CH-Chain 2	30 -1000	969.93	-44.459	-15.1	Pass
		1000 - 26500	24664	-17.155	-15.1	Pass
WLAN	802.11n-20M-High CH-Chain 2	30 -1000	838.01	-44.604	-15.8	Pass
		1000 - 26500	24690	-17.194	-15.8	Pass
WLAN	802.11n-40M-Low CH-Chain 0	30 -1000	807.94	-54.789	-18.9	Pass
		1000 - 26500	24639	-27.148	-18.9	Pass
WLAN	802.11n-40M-Mid CH-Chain 0	30 -1000	943.74	-53.306	-20.4	Pass
		1000 - 26500	24103	-26.88	-20.4	Pass
WLAN	802.11n-40M-High CH-Chain 0	30 -1000	682.81	-54.291	-20.1	Pass
		1000 - 26500	25761	-27.208	-20.1	Pass
WLAN	802.11n-40M-Low CH-Chain 1	30 -1000	953.44	-54.316	-16.4	Pass
		1000 - 26500	24690	-27.268	-16.4	Pass
WLAN	802.11n-40M-Mid CH-Chain 1	30 -1000	805.03	-54.062	-16.9	Pass
		1000 - 26500	25276	-27.213	-16.9	Pass
WLAN	802.11n-40M-High CH-Chain 1	30 -1000	917.55	-54.174	-16.6	Pass
		1000 - 26500	24664	-27.505	-16.6	Pass
WLAN	802.11n-40M-Low CH-Chain 2	30 -1000	802.12	-54.564	-17.8	Pass
		1000 - 26500	24639	-27.191	-17.8	Pass
WLAN	802.11n-40M-Mid CH-Chain 2	30 -1000	461.65	-54.62	-17.2	Pass
		1000 - 26500	24690	-28.02	-17.2	Pass
WLAN	802.11n-40M-High CH-Chain 2	30 -1000	906.88	-55.025	-17.2	Pass
		1000 - 26500	24715	-27.354	-17.2	Pass

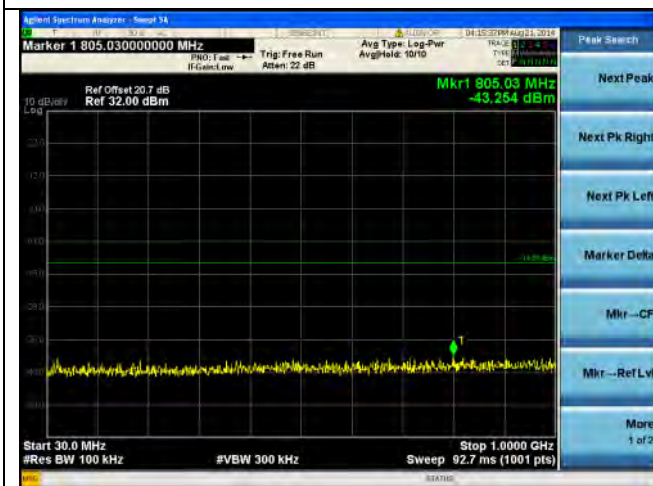
- Conducted Spurious Emissions Plots for non-restricted band



CSE-Below 1GHz-802.11b Low-chain0



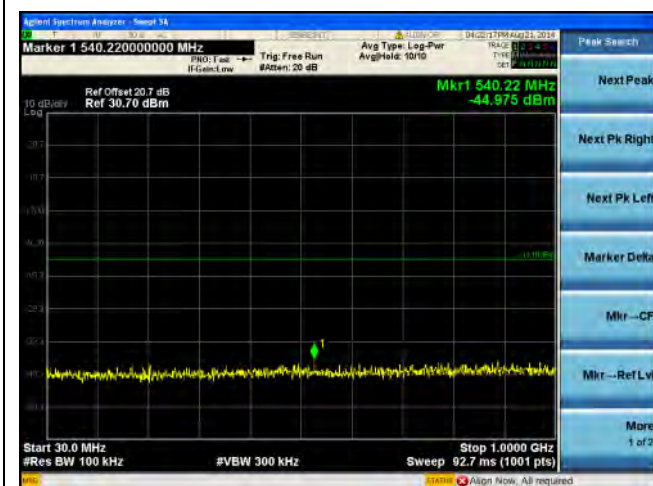
CSE-Above 1GHz-802.11b Low-chain0



CSE-Below 1GHz-802.11b Low-chain1



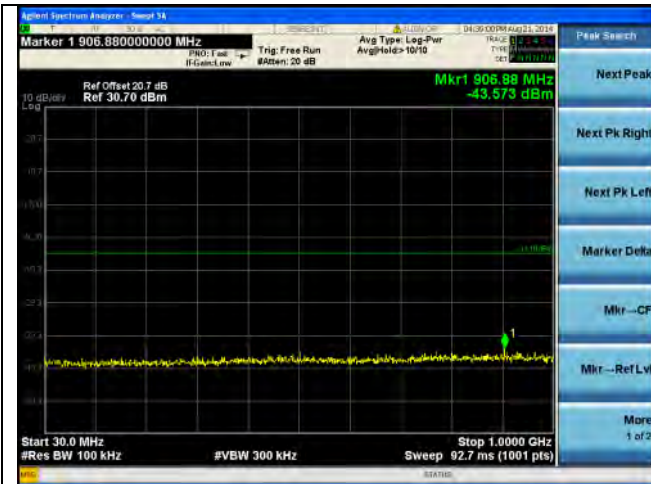
CSE-Above 1GHz-802.11b Low-chain1



CSE-Below 1GHz-802.11b Low-chain2



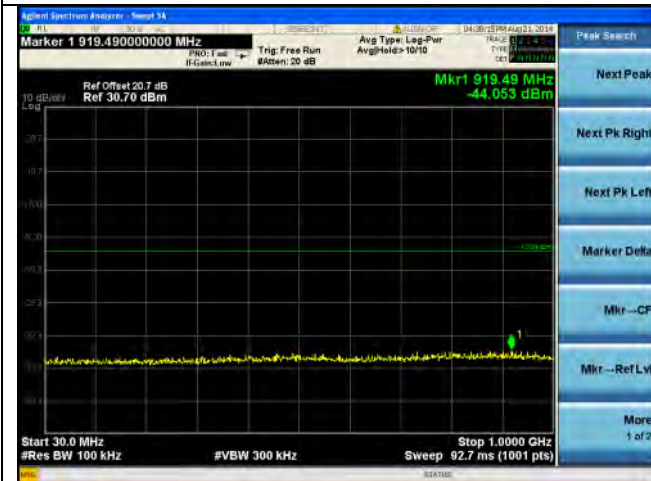
CSE-Above 1GHz-802.11b Low-chain2



CSE-Below 1GHz-802.11b Mid-chain0



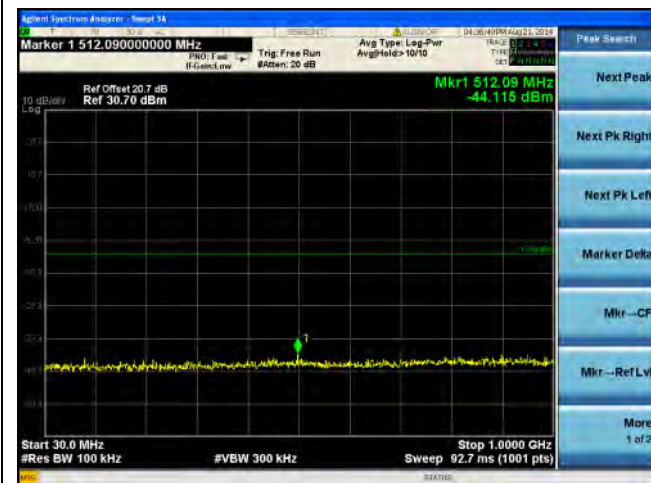
CSE-Above 1GHz-802.11b Mid-chain0



CSE-Below 1GHz-802.11b Mid-chain1



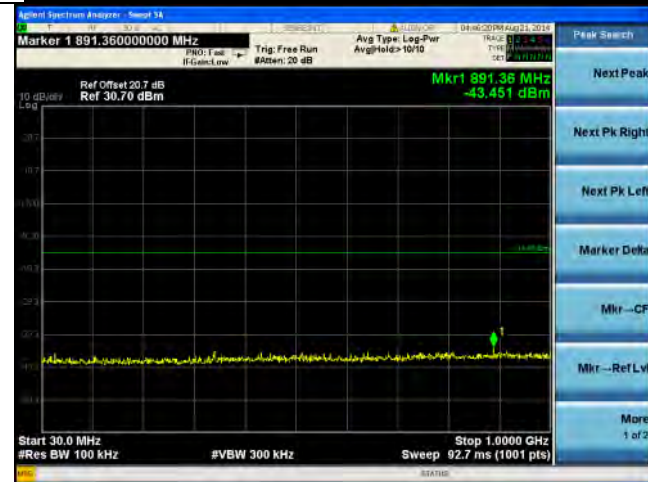
CSE-Above 1GHz-802.11b Mid-chain1



CSE-Below 1GHz-802.11b Mid-chain2



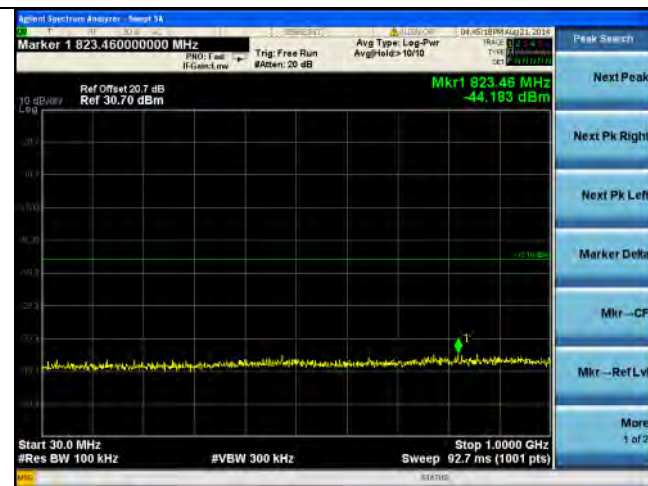
CSE-Above 1GHz-802.11b Mid-chain2



CSE-Below 1GHz-802.11b High-chain0



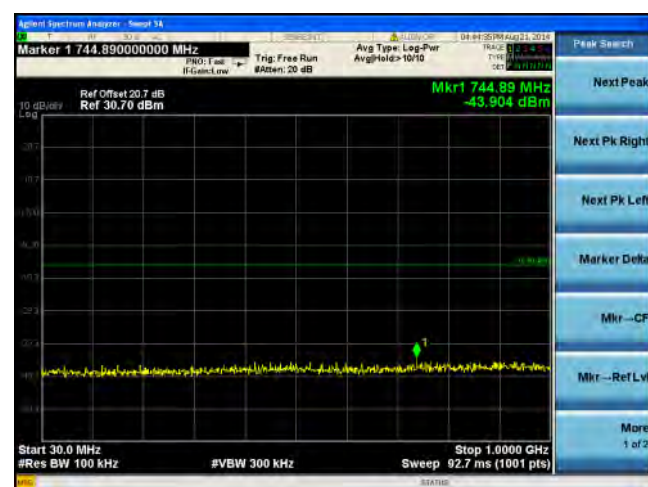
CSE-Above 1GHz-802.11b high-chain0



CSE-Below 1GHz-802.11b High-chain1



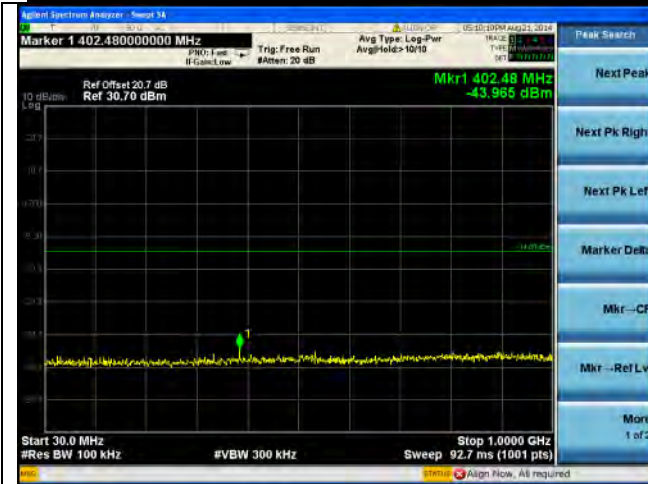
CSE-Above 1GHz-802.11b High-chain1



CSE-Below 1GHz-802.11b High-chain2



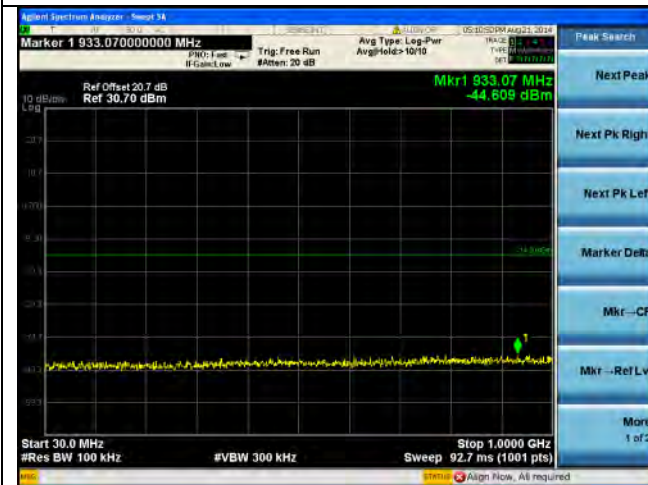
CSE-Above 1GHz-802.11b High-chain2



CSE-Below 1GHz-802.11g Low-chain0



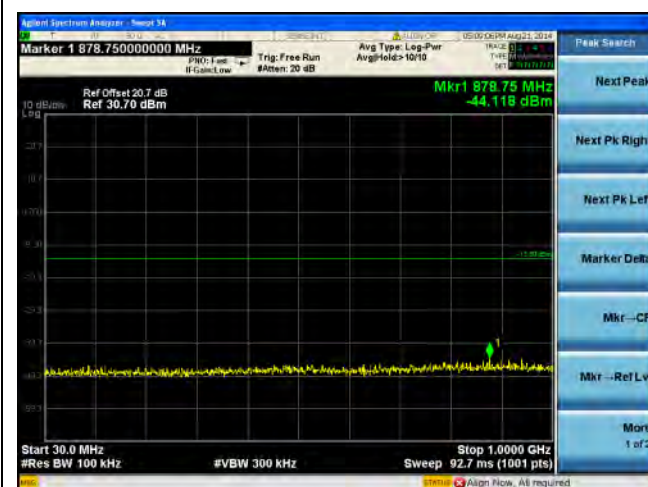
CSE-Above 1GHz-802.11g Low-chain0



CSE-Below 1GHz-802.11g Low-chain1



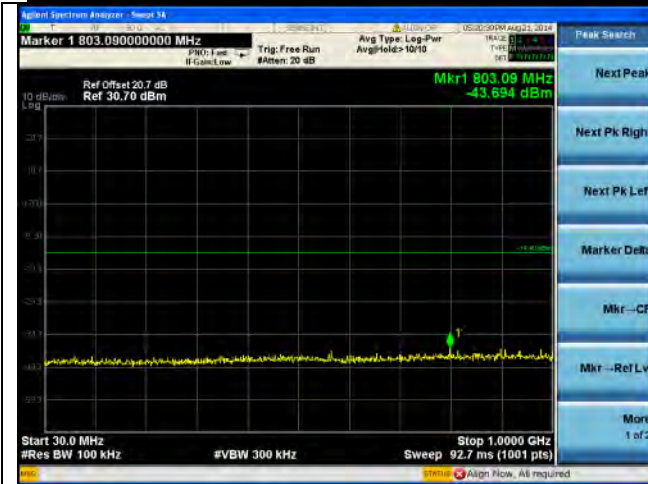
CSE-Above 1GHz-802.11g Low-chain1



CSE-Below 1GHz-802.11g Low-chain2



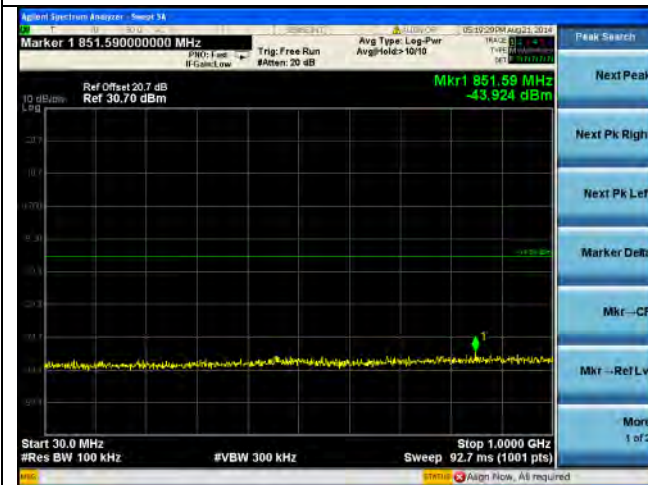
CSE-Above 1GHz-802.11g Low-chain2



CSE-Below 1GHz-802.11g Mid-chain0



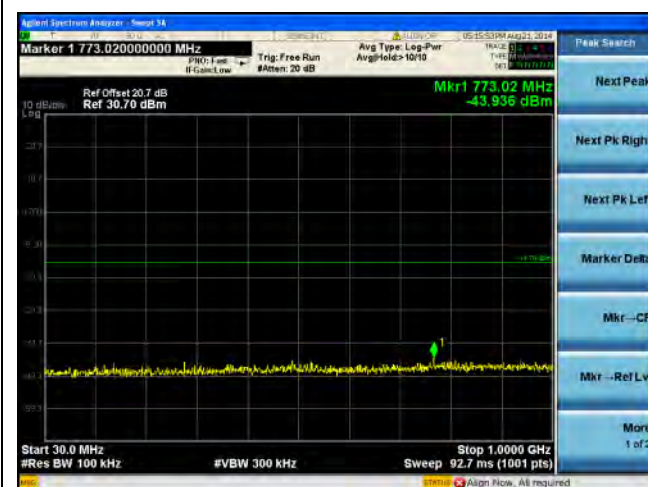
CSE-Above 1GHz-802.11g Mid-chain0



CSE-Below 1GHz-802.11g Mid-chain1



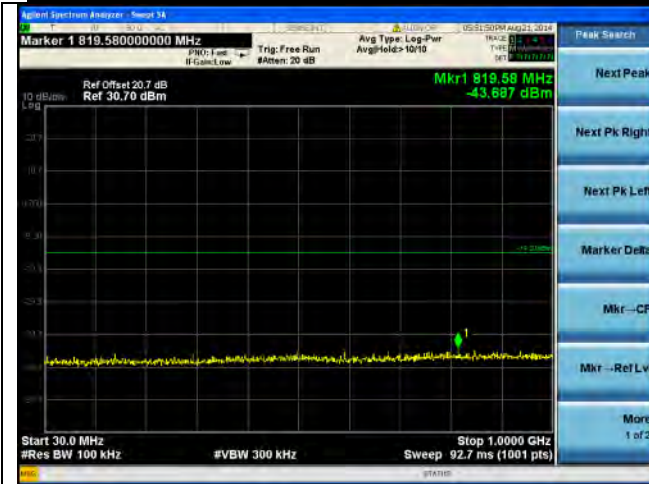
CSE-Above 1GHz-802.11g Mid-chain1



CSE-Below 1GHz-802.11g Mid-chain2



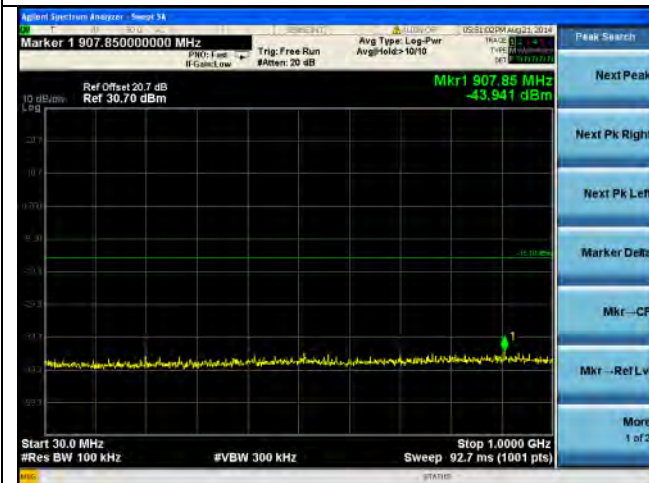
CSE-Above 1GHz-802.11g Mid-chain2



CSE-Below 1GHz-802.11g High-chain0



CSE-Above 1GHz-802.11g high-chain0



CSE-Below 1GHz-802.11g High-chain1



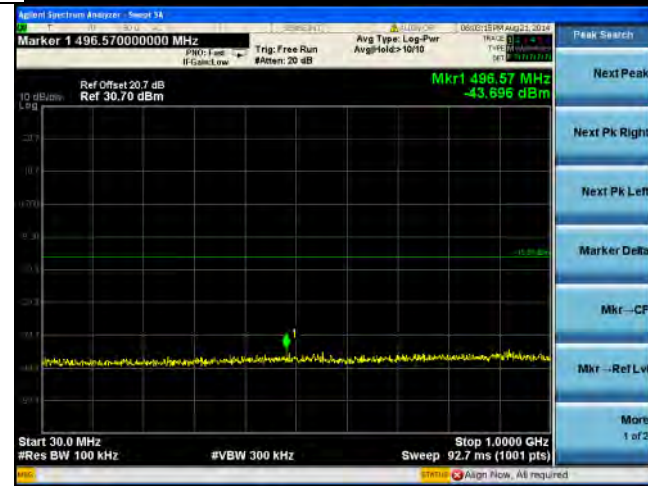
CSE-Above 1GHz-802.11g High-chain1



CSE-Below 1GHz-802.11g High-chain2



CSE-Above 1GHz-802.11g High-chain2



CSE-Below 1GHz-802.11n-20M Low-chain0



CSE-Above 1GHz-802.11n-20M Low-chain0



CSE-Below 1GHz-802.11n-20M Low-chain1



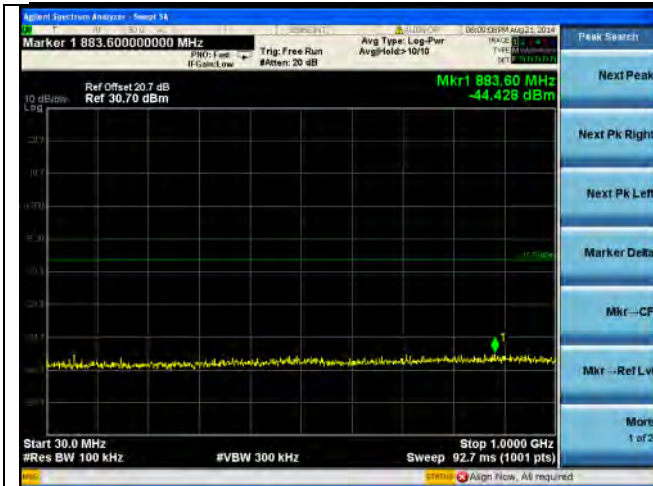
CSE-Above 1GHz-802.11n-20M Low-chain1



CSE-Below 1GHz-802.11n-20M Low-chain2



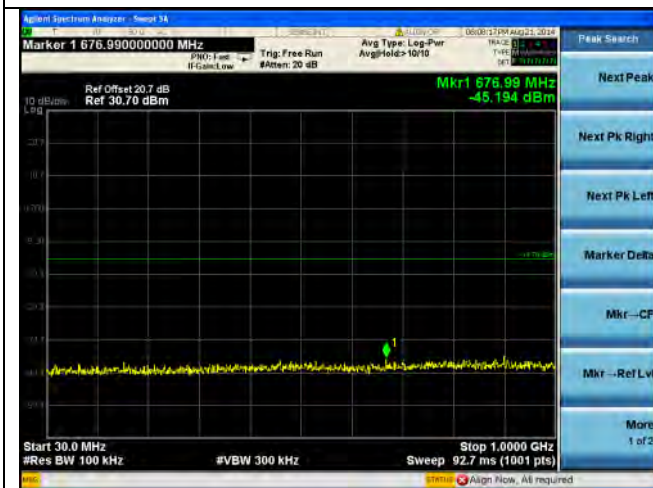
CSE-Above 1GHz-802.11n-20M Low-chain2



CSE-Below 1GHz-802.11n-20M Mid-chain0



CSE-Above 1GHz-802.11n-20M Mid-chain0



CSE-Below 1GHz-802.11n-20M Mid-chain1



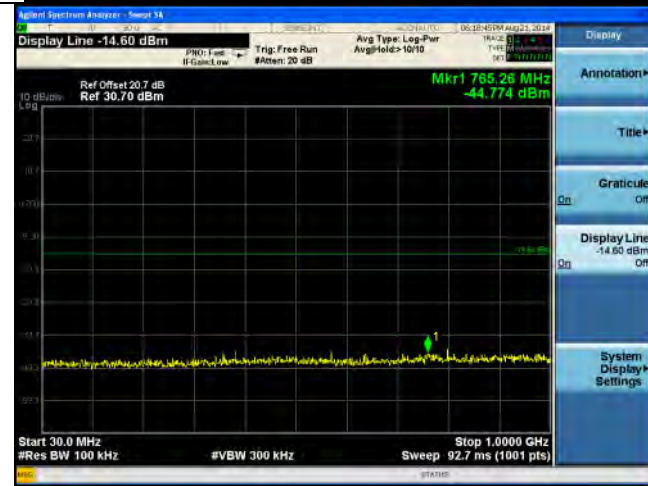
CSE-Above 1GHz-802.11n-20M Mid-chain1



CSE-Below 1GHz-802.11n-20M Mid-chain2



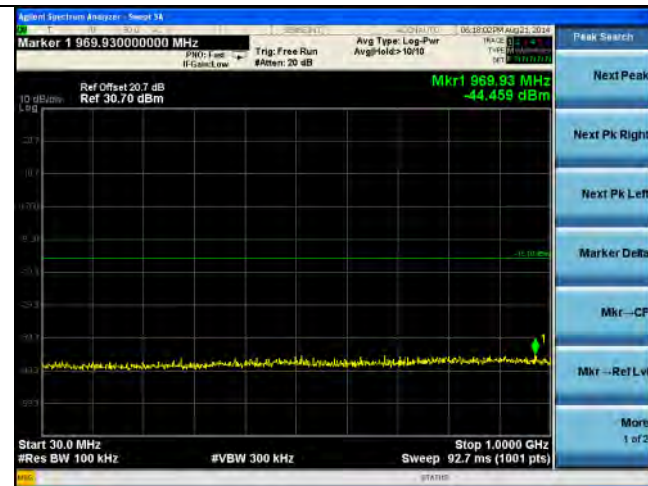
CSE-Above 1GHz-802.11n-20M Mid-chain2



CSE-Below 1GHz-802.11n-20M High-chain0



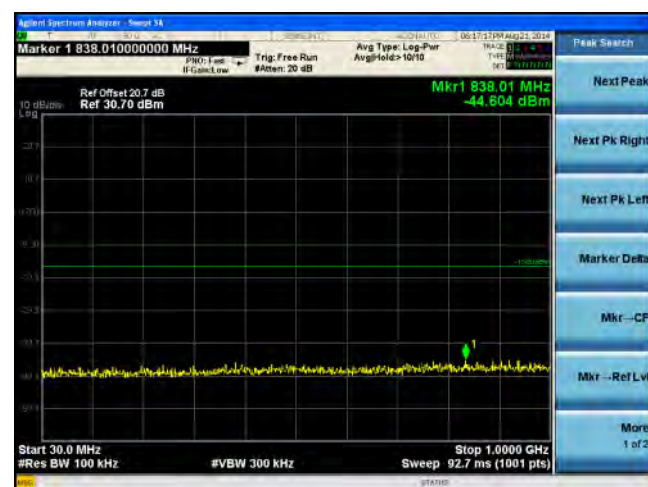
CSE-Above 1GHz-802.11n-20M high-chain0



CSE-Below 1GHz-802.11n-20M High-chain1



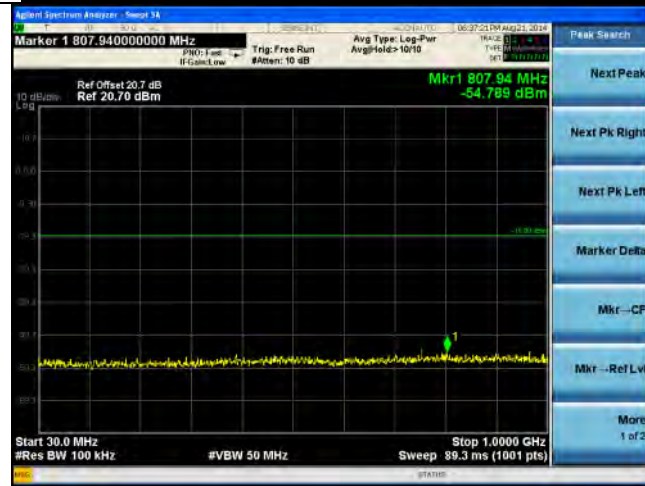
CSE-Above 1GHz-802.11n-20M High -chain1



CSE-Below 1GHz-802.11n-20M -chain2



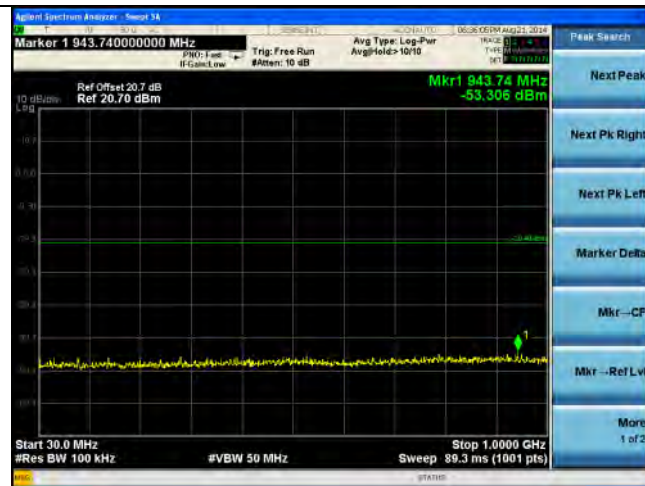
CSE-Above 1GHz-802.11n-20M High -chain2



CSE-Below 1GHz-802.11n-40M Low-chain0



CSE-Above 1GHz-802.11n-40M Low-chain0



CSE-Below 1GHz-802.11n-40M Low-chain1



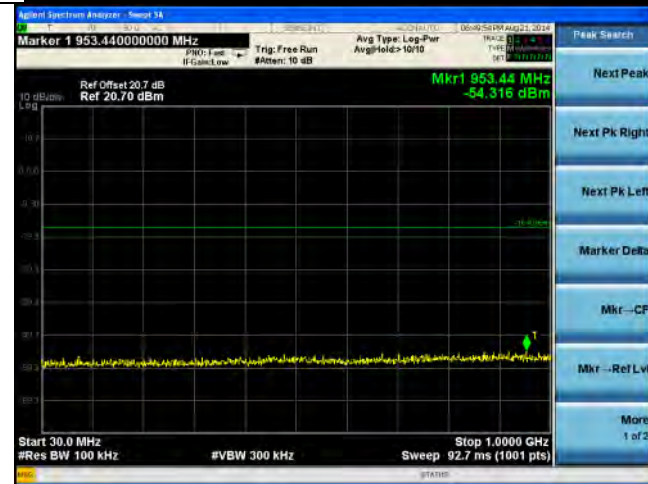
CSE-Above 1GHz-802.11n-40M Low-chain1



CSE-Below 1GHz-802.11n-40M Low-chain2



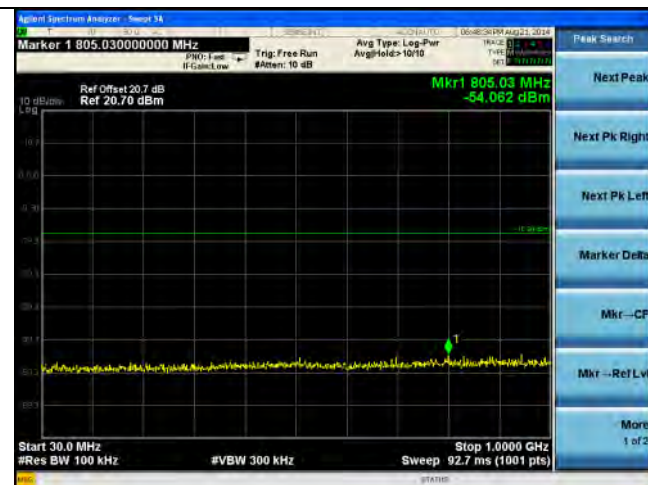
CSE-Above 1GHz-802.11n-40M Low-chain2



CSE-Below 1GHz-802.11n-40M Mid-chain0



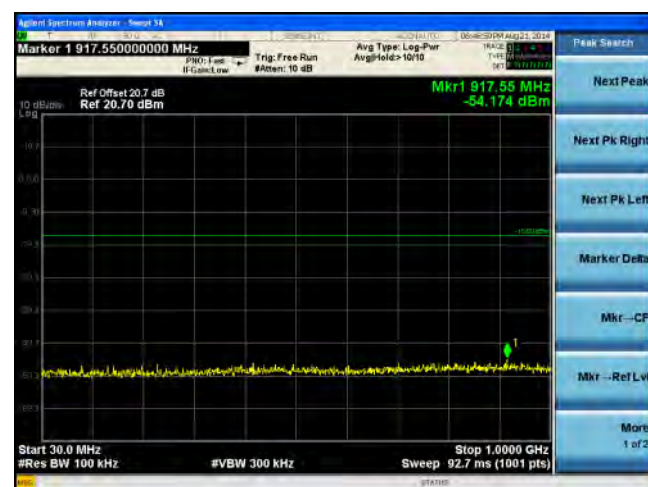
CSE-Above 1GHz-802.11n-40M Mid-chain0



CSE-Below 1GHz-802.11n-40M Mid-chain1



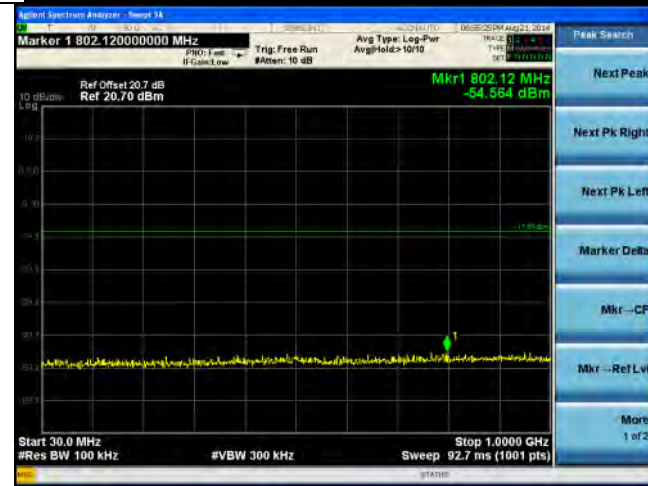
CSE-Above 1GHz-802.11n-40M Mid-chain1



CSE-Below 1GHz-802.11n-40M Mid-chain2



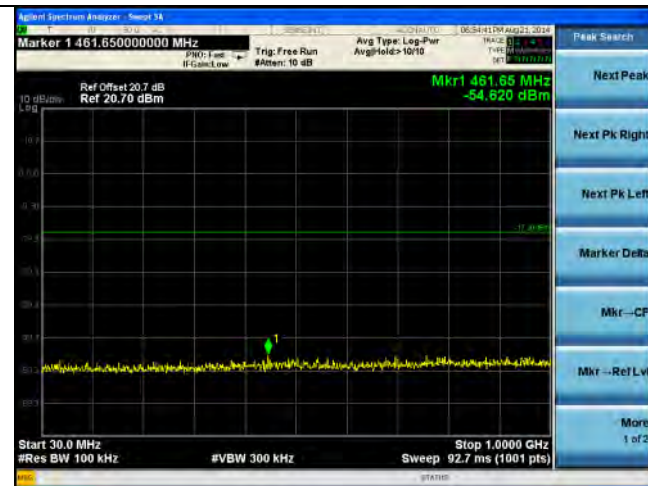
CSE-Above 1GHz-802.11n-40M Mid-chain2



CSE-Below 1GHz-802.11n-40M High-chain0



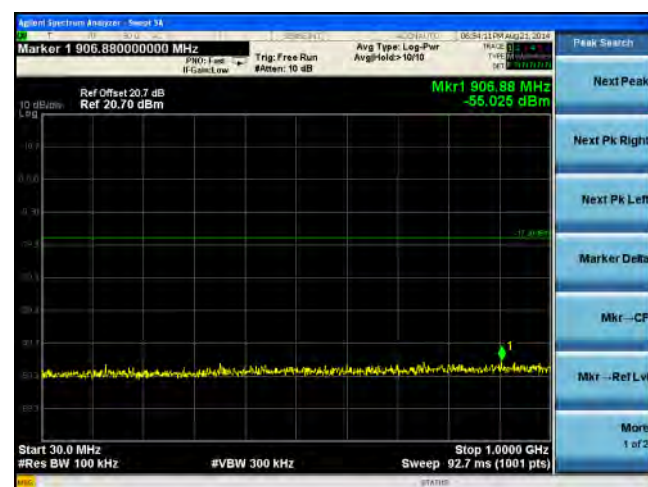
CSE-Above 1GHz-802.11n-40M high-chain0



CSE-Below 1GHz-802.11n-40M High-chain1



CSE-Above 1GHz-802.11n-40M High -chain1



CSE-Below 1GHz-802.11n-40M -chain2



CSE-Above 1GHz-802.11n-40M High -chain2

10.7 Conducted Spurious Emissions in restricted band

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247	-	Restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	558074 D01 DTS Meas Guidance v03r02 <u>Conducted Spurious Emissions measurement procedure for restricted band</u> - Measure the conducted output power (in dBm) using the detector specified - Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level - Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz). - For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW). - Convert the resultant EIRP level to an equivalent electric field strength using the following relationship: $E = \text{EIRP} - 20\log D + 104.8$ where: E = electric field strength in dBμV/m, EIRP = equivalent isotropic radiated power in dBm D = specified measurement distance in meters. f) Compare the resultant electric field strength level to the applicable limit.		
Test Date	08/21/2014-09/30/2014	Environmental condition	Temperature 24°C Relative Humidity 47% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Restricted Band Edge measurement result for horizontal antenna chain (single antenna) – 2.4GHz

Test Mode	Frequency (MHz)	Conducted Measurement (dBm)	Antenna Gain (dBi)	Level (dBuV/m)	Measurement Type	Limit (dBuV/m)	Margin dB	Result
		Chain 0						
802.11b Low Channel	2390.0	-46.30	1	49.93	Peak Max	74	-24.07	Pass
	2390.0	-60.26	1	35.97	Average Max	54	-18.03	Pass
802.11g Low Channel	2390.0	-33.13	1	63.1	Peak Max	74	-10.9	Pass
	2390.0	-52.14	1	44.09	Average Max	54	-9.91	Pass
802.11n-20 Low Channel	2390.0	-31.85	1	64.38	Peak Max	74	-9.62	Pass
	2390.0	-52.46	1	43.77	Average Max	54	-10.23	Pass
802.11n-40 Low Channel	2390.0	-35.56	1	60.67	Peak Max	74	-13.33	Pass
	2390.0	-53.76	1	42.47	Average Max	54	-11.53	Pass
802.11b High Channel	2483.5	-48.09	1	48.14	Peak Max	74	-25.86	Pass
	2483.5	-61.41	1	34.82	Average Max	54	-19.18	Pass
802.11g High Channel	2483.5	-38.41	1	57.82	Peak Max	74	-16.18	Pass
	2483.5	-59.07	1	37.16	Average Max	54	-16.84	Pass
802.11n-20 High Channel	2483.5	-39.42	1	56.81	Peak Max	74	-17.19	Pass
	2483.5	-58.03	1	38.2	Average Max	54	-15.8	Pass
802.11n-40 High Channel	2483.5	-31.46	1	64.77	Peak Max	74	-9.23	Pass
	2483.5	-51.60	1	44.63	Average Max	54	-9.37	Pass

Restricted Band Edge measurement result for vertical antenna chains (two antennas) – 2.4GHz

Test Mode	Frequency (MHz)	Conducted Measurement (dBm)			Combined Antenna Gain (dBi)	Level (dBuV/m)	Measurement Type	Limit (dBuV/m)	Margin dB	Result
		Chain 1	Chain 2	Combined Power or Highest Power						
802.11b Low Channel	2390.0	-46.97	-45.87	-45.87	1	50.36	Peak Max	74	-23.64	Pass
	2390.0	-59.05	-59.58	-59.05	1	37.18	Average Max	54	-16.82	Pass
802.11g Low Channel	2390.0	-36.24	-33.75	-33.75	1	62.48	Peak Max	74	-11.52	Pass
	2390.0	-54.74	-54.71	-54.71	1	41.52	Average Max	54	-12.48	Pass
802.11n-20 Low Channel	2390.0	-35.3	-32.83	-30.88	4	68.35	Peak Max	74	-5.65	Pass
	2390.0	-52.96	-53.84	-50.37	4	48.86	Average Max	54	-5.14	Pass
802.11n-40 Low Channel	2390.0	-36.00	-36.92	-33.43	4	65.8	Peak Max	74	-8.2	Pass
	2390.0	-55.75	-54.64	-52.15	4	47.08	Average Max	54	-6.92	Pass
802.11b High Channel	2483.5	-48.78	-48.52	-48.52	1	47.71	Peak Max	74	-26.29	Pass
	2483.5	-61.45	-61.32	-61.32	1	34.91	Average Max	54	-19.09	Pass
802.11g High Channel	2483.5	-43.31	-39.66	-39.66	1	56.57	Peak Max	74	-17.43	Pass
	2483.5	-59.61	-58.68	-58.68	1	37.55	Average Max	54	-16.45	Pass
802.11n-20 High Channel	2483.5	-37.84	-34.57	-32.89	4	66.34	Peak Max	74	-7.66	Pass
	2483.5	-57.77	-56.66	-54.17	4	45.06	Average Max	54	-8.94	Pass
802.11n-40 High Channel	2483.5	-36.39	-33.84	-31.92	4	67.31	Peak Max	74	-6.69	Pass
	2483.5	-53.56	-51.60	-49.46	4	49.77	Average Max	54	-4.23	Pass

Restricted Band spurious emission measurement result for horizontal antenna chain (single antenna) – 2.4GHz

Test Mode	Frequency (MHz)	Conducted Measurement (dBm)	Antenna Gain (dBi)	Level (dBuV/m)	Measurement Type	Limit (dBuV/m)	Margin dB	Result
		Chain 0						
802.11b Low Channel	926.3	-75.39	1	20.84	Peak Max	46	-25.16	Pass
	4824.0	-46.83	1	49.40	Peak Max	74	-24.60	Pass
	4824.0	-57.32	1	38.91	Average Max	54	-15.09	Pass
802.11g Low Channel	856.3	-75.09	1	21.14	Peak Max	46	-24.86	Pass
	4824.0	-44.21	1	52.02	Peak Max	74	-21.98	Pass
	4824.0	-56.63	1	39.60	Average Max	54	-14.40	Pass
802.11n-20 Low Channel	904.2	-73.21	1	23.02	Peak Max	46	-22.98	Pass
	4824.0	-49.65	1	46.58	Peak Max	74	-27.42	Pass
	4824.0	-59.82	1	36.41	Average Max	54	-17.59	Pass
802.11n-40 Low Channel	862.3	-77.44	1	18.79	Peak Max	46	-27.21	Pass
	4844.0	-50.34	1	45.89	Peak Max	74	-28.11	Pass
	4844.0	-60.32	1	35.91	Average Max	54	-18.09	Pass
802.11b Mid Channel	833.9	-78.02	1	18.21	Peak Max	46	-27.79	Pass
	4874.0	-48.33	1	47.90	Peak Max	74	-26.10	Pass
	4874.0	-62.11	1	34.12	Average Max	54	-19.88	Pass
802.11g Mid Channel	723.8	-72.33	1	23.90	Peak Max	46	-22.10	Pass
	4874.0	-51.32	1	44.91	Peak Max	74	-29.09	Pass
	4874.0	-63.52	1	32.71	Average Max	54	-21.29	Pass
802.11n-20 Mid Channel	384.1	-74.82	1	21.41	Peak Max	46	-24.59	Pass
	4874.0	-47.73	1	48.50	Peak Max	74	-25.50	Pass
	4874.0	-60.43	1	35.80	Average Max	54	-18.20	Pass
802.11n-40 Mid Channel	192.1	-69.91	1	26.32	Peak Max	43.5	-17.18	Pass
	4874.0	-50.33	1	45.90	Peak Max	74	-28.10	Pass
	4874.0	-61.92	1	34.31	Average Max	54	-19.69	Pass
802.11b High Channel	442.0	-71.92	1	24.31	Peak Max	46	-21.69	Pass
	4924.0	-51.92	1	44.31	Peak Max	74	-29.69	Pass
	4924.0	-62.60	1	33.63	Average Max	54	-20.37	Pass
802.11g High Channel	872.1	-74.02	1	22.21	Peak Max	46	-23.79	Pass
	4924.0	-53.82	1	42.41	Peak Max	74	-31.59	Pass
	4924.0	-62.80	1	33.43	Average Max	54	-20.57	Pass
802.11n-20 High Channel	664.3	-70.83	1	25.40	Peak Max	46	-20.60	Pass
	4924.0	-49.73	1	46.50	Peak Max	74	-27.50	Pass
	4924.0	-61.82	1	34.41	Average Max	54	-19.59	Pass
802.11n-40 High Channel	883.1	-72.73	1	23.50	Peak Max	46	-22.50	Pass
	4904.0	-55.83	1	40.40	Peak Max	74	-33.60	Pass
	4904.0	-64.93	1	31.30	Average Max	54	-22.70	Pass
Note:	The ground reflection factor of 4.7 dB for 30 MHz – 1GHz frequency range has been consider in the raw reading from conducted port.							

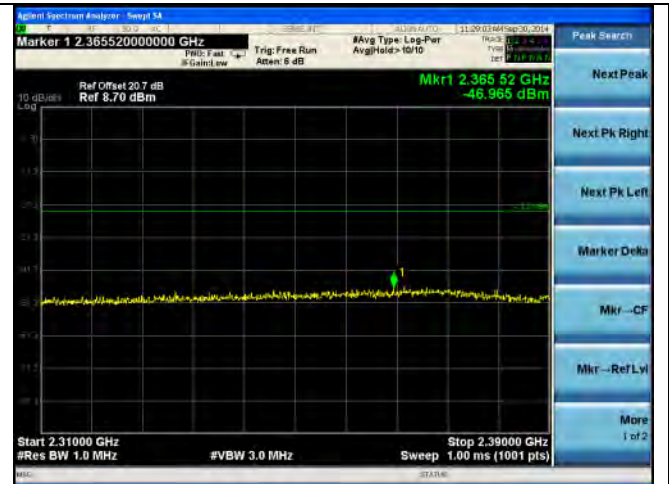
Restricted Band spurious emission measurement result for vertical antenna chains (two antennas) – 2.4GHz

Test Mode	Frequency (MHz)	Conducted Measurement (dBm)			Combined Antenna Gain (dBi)	Level (dBuV/m)	Measurement Type	Limit (dBuV/m)	Margin dB	Result
		Chain 1	Chain 2	Combined Power or Highest Power						
802.11b Low Channel	910.7	-75.26	-75.61	-72.42	1	23.81	Peak Max	46	-22.19	Pass
	4824.0	-46.75	-46.97	-43.85	1	52.38	Peak Max	74	-21.62	Pass
	4824.0	-57.22	-57.49	-54.34	1	41.89	Average Max	54	-12.11	Pass
802.11g Low Channel	841.9	-74.96	-75.31	-72.12	1	24.11	Peak Max	46	-21.89	Pass
	4824.0	-44.14	-44.34	-41.23	1	55.00	Peak Max	74	-19.00	Pass
	4824.0	-56.53	-56.80	-53.65	1	42.58	Average Max	54	-11.42	Pass
802.11n-20 Low Channel	889.0	-73.09	-73.43	-70.24	4	28.99	Peak Max	46	-17.01	Pass
	4824.0	-49.57	-49.80	-46.67	4	52.56	Peak Max	74	-21.44	Pass
	4824.0	-59.72	-60.00	-56.85	4	42.38	Average Max	54	-11.62	Pass
802.11n-40 Low Channel	847.8	-77.31	-77.67	-74.48	4	24.75	Peak Max	46	-21.25	Pass
	4844.0	-50.26	-50.49	-47.36	4	51.87	Peak Max	74	-22.13	Pass
	4844.0	-60.22	-60.50	-57.35	4	41.88	Average Max	54	-12.12	Pass
802.11b Mid Channel	819.9	-77.89	-78.25	-75.06	1	21.17	Peak Max	46	-24.83	Pass
	4874.0	-48.25	-48.47	-45.35	1	50.88	Peak Max	74	-23.12	Pass
	4874.0	-62.01	-62.29	-59.14	1	37.09	Average Max	54	-16.91	Pass
802.11g Mid Channel	711.6	-72.21	-72.54	-69.36	1	26.87	Peak Max	46	-19.13	Pass
	4874.0	-51.23	-51.47	-48.34	1	47.89	Peak Max	74	-26.11	Pass
	4874.0	-63.41	-63.71	-60.55	1	35.68	Average Max	54	-18.32	Pass
802.11n-20 Mid Channel	377.6	-74.69	-75.04	-71.85	4	27.38	Peak Max	46	-18.62	Pass
	4874.0	-47.65	-47.87	-44.75	4	54.48	Peak Max	74	-19.52	Pass
	4874.0	-60.33	-60.61	-57.46	4	41.77	Average Max	54	-12.23	Pass
802.11n-40 Mid Channel	188.9	-69.79	-70.12	-66.94	4	32.29	Peak Max	43.5	-11.21	Pass
	4792.1	-50.25	-50.48	-47.35	4	51.88	Peak Max	74	-22.12	Pass
	4874.0	-61.82	-62.10	-58.95	4	40.28	Average Max	54	-13.72	Pass
802.11b High Channel	442.0	-71.80	-72.13	-68.95	1	27.28	Peak Max	46	-18.72	Pass
	4841.3	-51.83	-52.07	-48.94	1	47.29	Peak Max	74	-26.71	Pass
	4924.0	-62.49	-62.78	-59.63	1	36.60	Average Max	54	-17.40	Pass
802.11g High Channel	872.1	-73.90	-74.24	-71.05	1	25.18	Peak Max	46	-20.82	Pass
	4841.3	-53.73	-53.98	-50.84	1	45.39	Peak Max	74	-28.61	Pass
	4924.0	-62.69	-62.99	-59.83	1	36.40	Average Max	54	-17.60	Pass
802.11n-20 High Channel	664.3	-70.71	-71.04	-67.86	4	31.37	Peak Max	46	-14.63	Pass
	4841.3	-49.65	-49.88	-46.75	4	52.48	Peak Max	74	-21.52	Pass
	4924.0	-61.72	-62.00	-58.85	4	40.38	Average Max	54	-13.62	Pass
802.11n-40 High Channel	883.1	-72.61	-72.94	-69.76	4	29.47	Peak Max	46	-16.53	Pass
	4821.6	-55.74	-55.99	-52.85	4	46.38	Peak Max	74	-27.62	Pass
	4904.0	-64.82	-65.12	-61.96	4	37.27	Average Max	54	-16.73	Pass
Note	The ground reflection factor of 4.7 dB for 30 MHz – 1GHz frequency range has been consider in the raw reading from conducted port.									

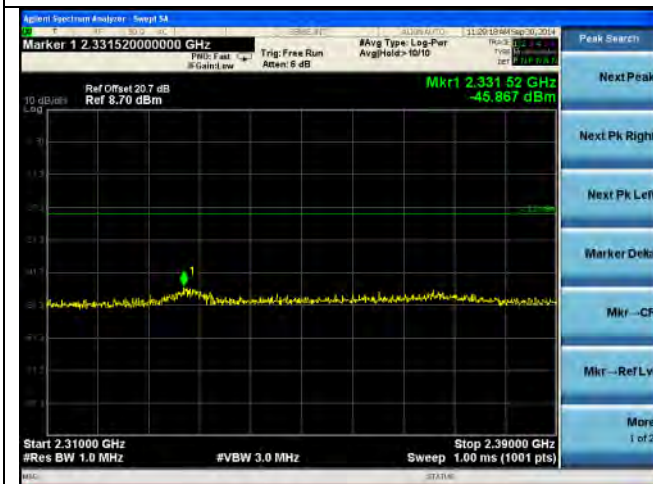
- **Restricted Band Measurement (Peak) Plots:**



Lower Restrcted Band-802.11b-low-chain0



Lower Restrcted Band-802.11b-low-chain1



Lower Restrcted Band-802.11b-low-chain2



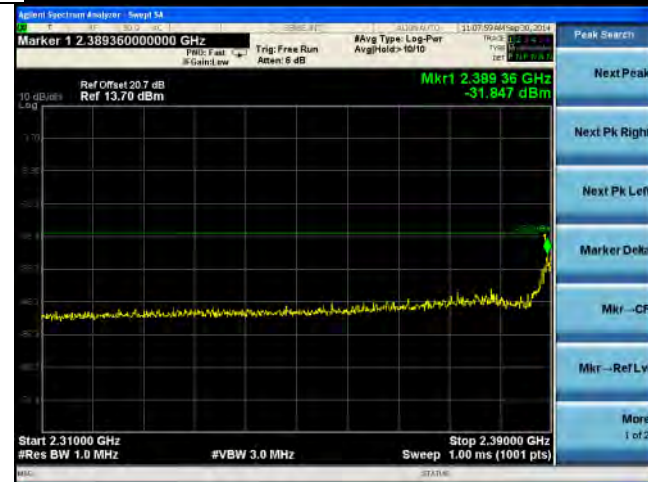
Lower Restrcted Band-802.11g-low-chain0



Lower Restrcted Band-802.11g-low-chain1



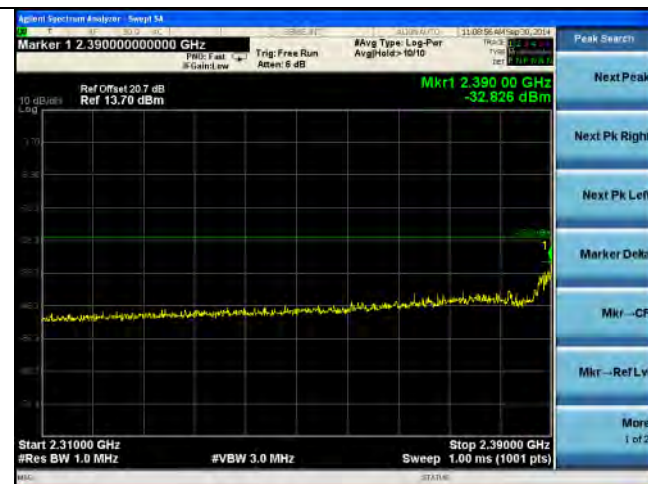
Lower Restrcted Band-802.11g-low-chain2



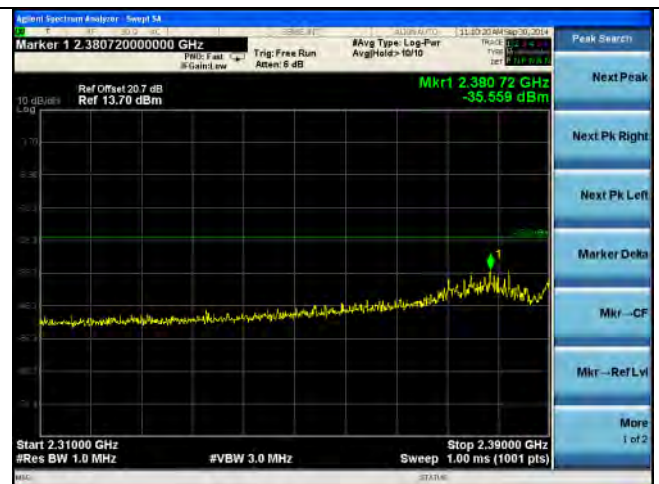
Lower Restricted Band-802.11n-20-low-chain0



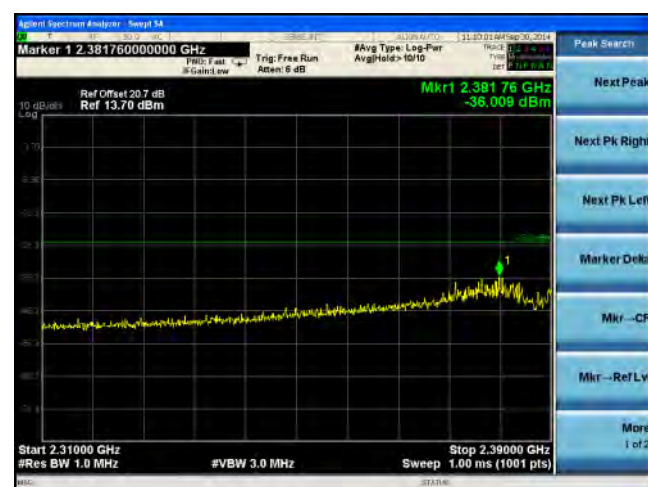
Lower Restricted Band-802.11n-20-low-chain1



Lower Restricted Band-802.11n-20-low-chain2



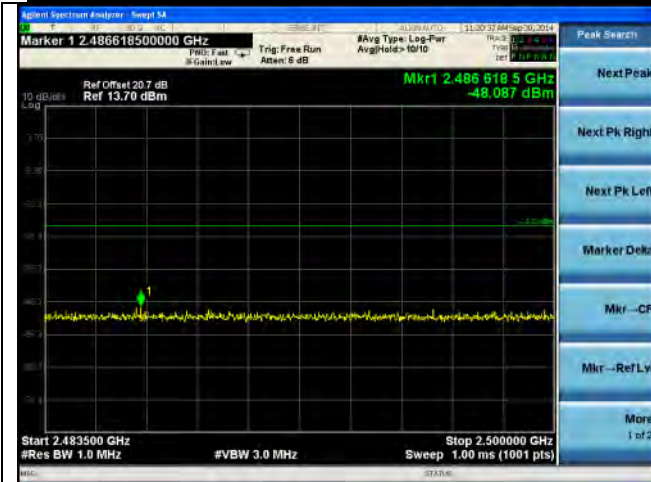
Lower Restricted Band-802.11n-40-low-chain0



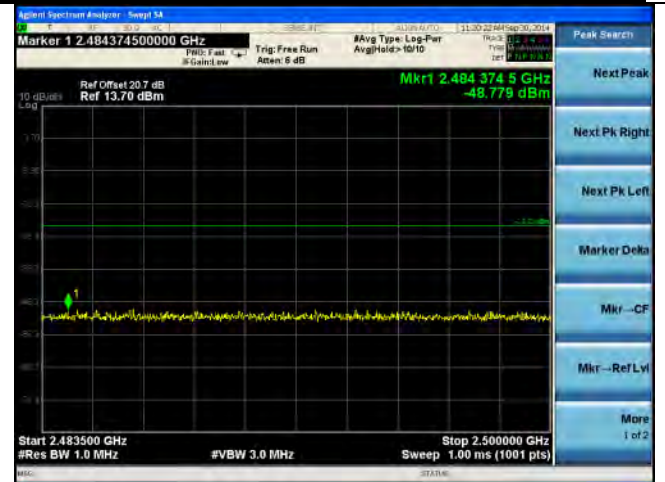
Lower Restricted Band-802.11n-40-low-chain1



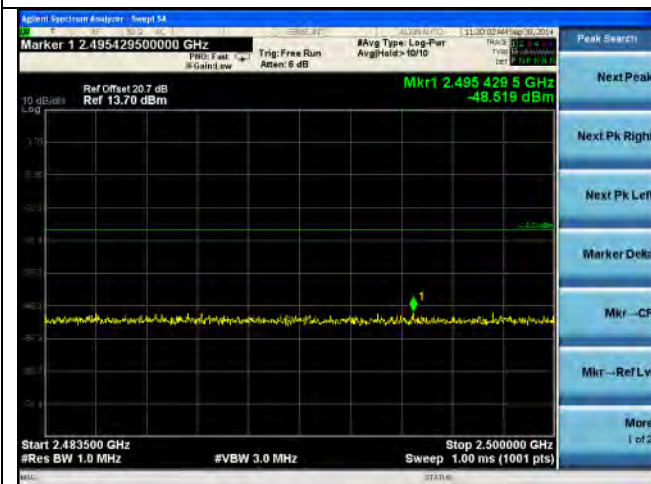
Lower Restricted Band-802.11n-40-low-chain2



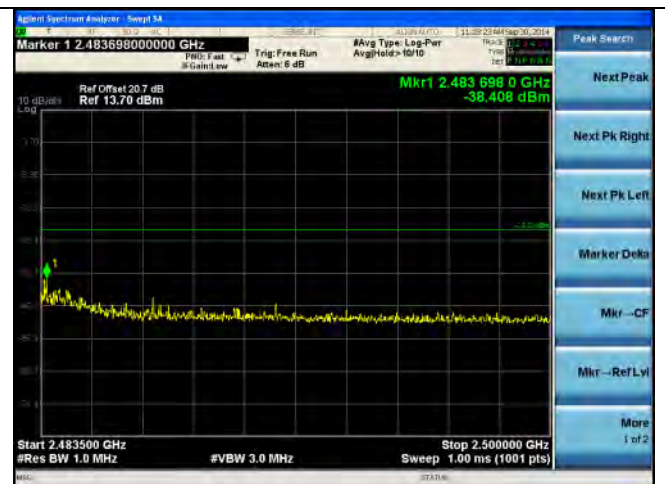
Higher Restrictd Band-802.11b-high-chain0



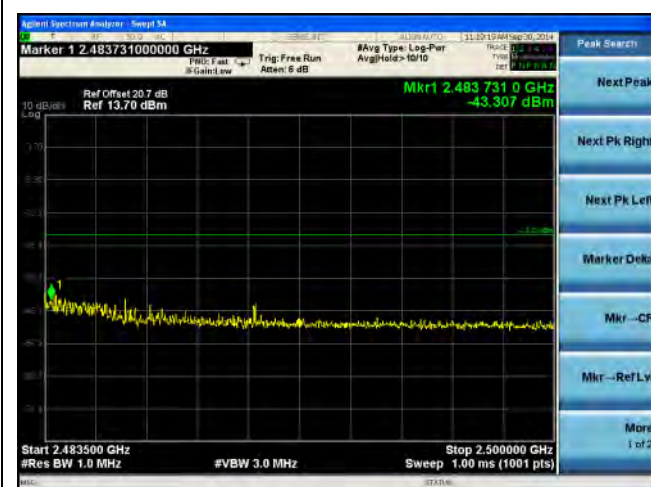
Higher Restrictd Band-802.11b-high-chain1



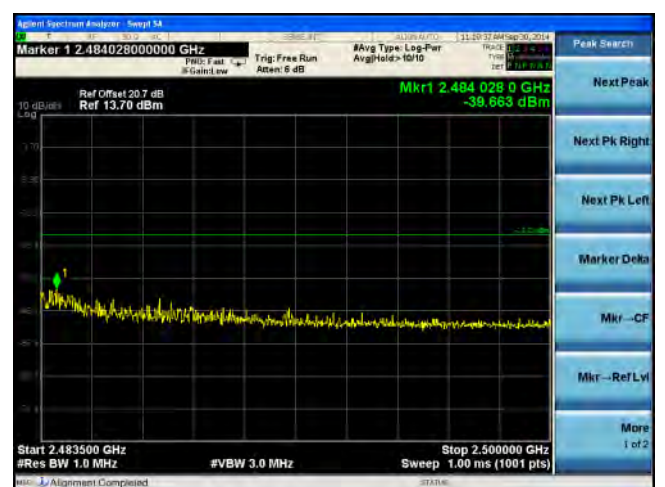
Higher Restrictd Band-802.11b-high-chain2



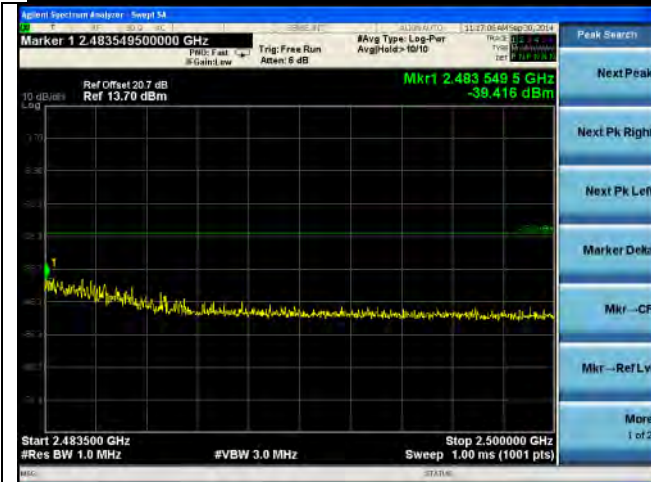
Higher Restrictd Band-802.11g-high-chain0



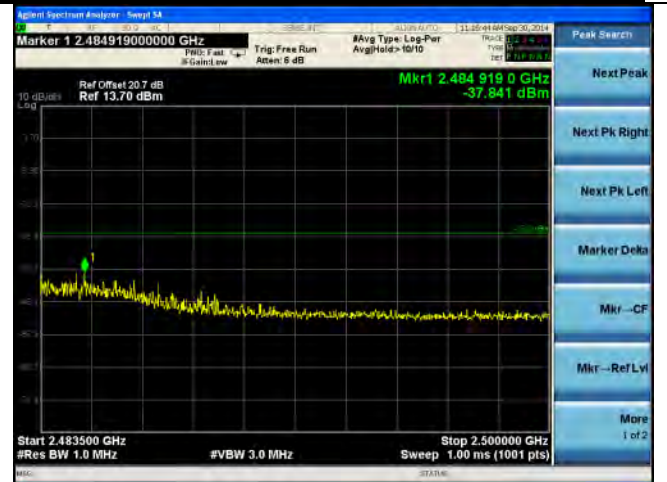
Higher Restrictd Band-802.11g-high-chain1



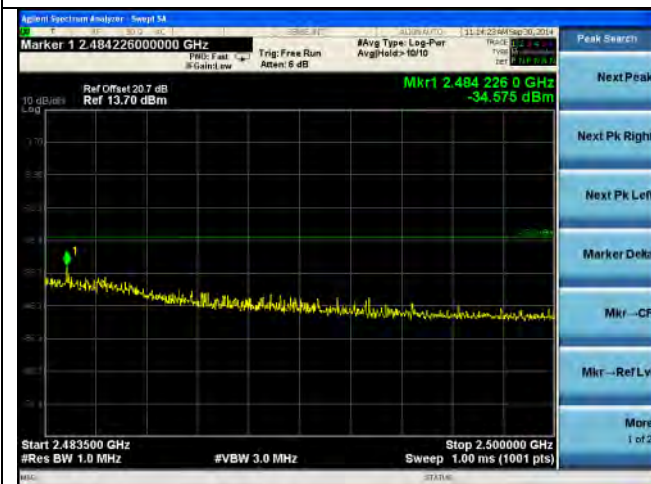
Higher Restrictd Band-802.11g-high-chain2



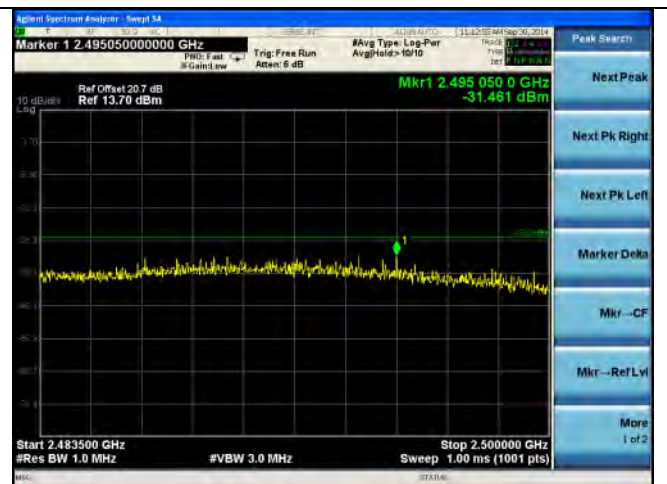
Higher Restricted Band-802.11n-20-high-chain0



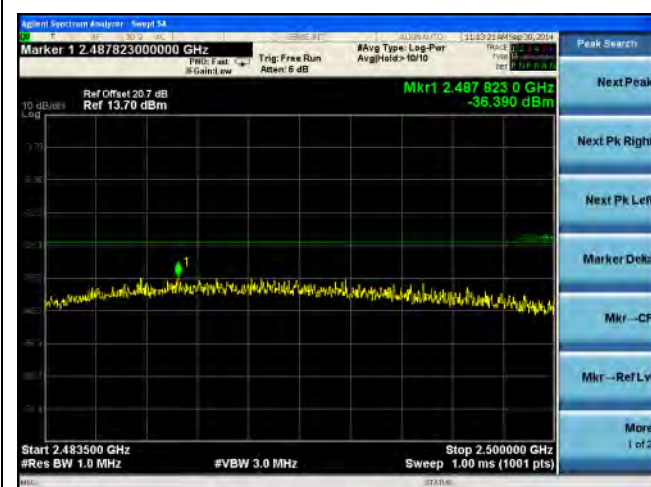
Higher Restricted Band-802.11n-20-high-chain1



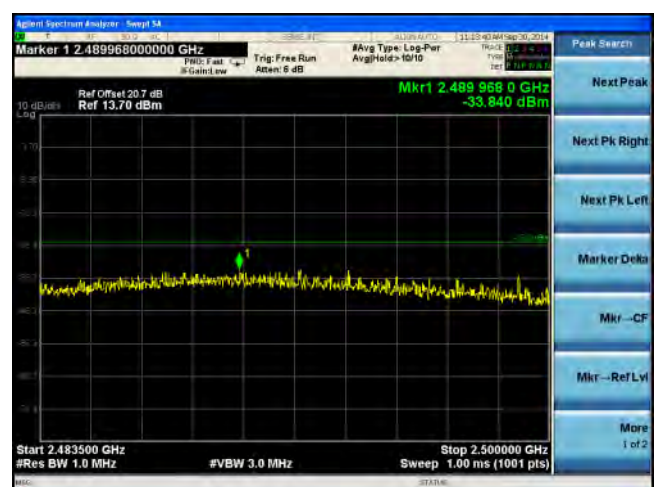
Higher Restricted Band-802.11n-20-high-chain2



Higher Restricted Band-802.11n-40-high-chain0



Higher Restricted Band-802.11n-40-high-chain1



Higher Restricted Band-802.11n-40-high-chain2

- Restricted Band Measurement (Average) Plots:



Lower Restrictd Band-802.11b-low-chain0



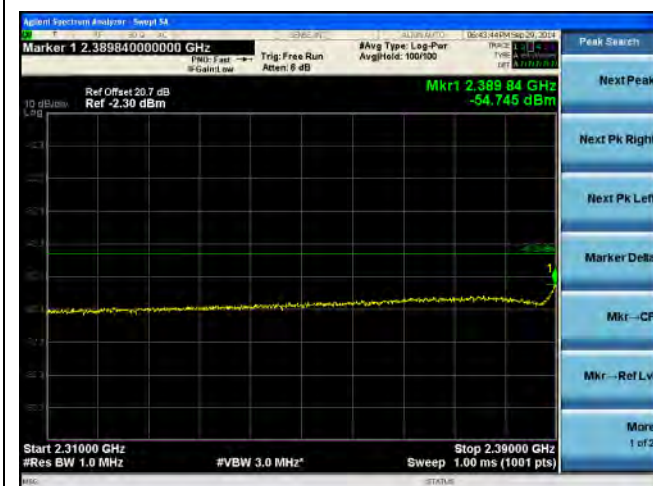
Lower Restrictd Band-802.11b-low-chain1



Lower Restrictd Band-802.11b-low-chain2



Lower Restrictd Band-802.11g-low-chain0



Lower Restrictd Band-802.11g-low-chain1



Lower Restrictd Band-802.11g-low-chain2



Lower Restrictd Band-802.11n-20-low-chain0



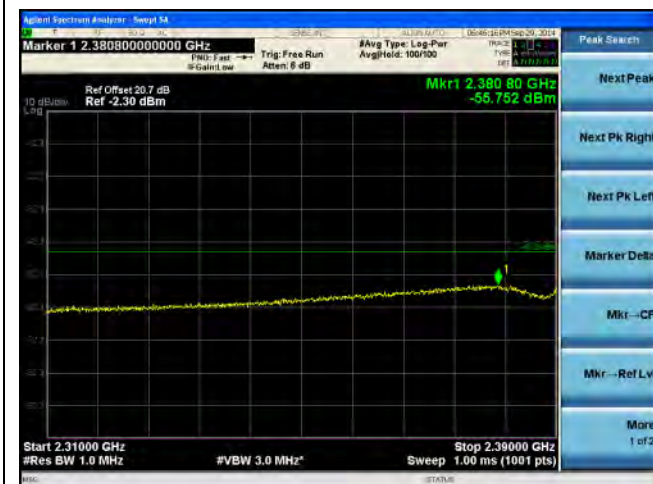
Lower Restrictd Band-802.11n-20-low-chain1



Lower Restrictd Band-802.11n-20-low-chain2



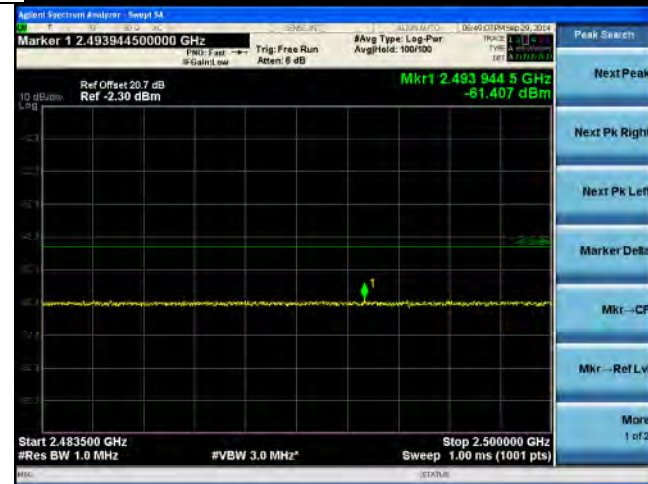
Lower Restrictd Band-802.11n-40-low-chain0



Lower Restrictd Band-802.11n-40-low-chain1



Lower Restrictd Band-802.11n-40-low-chain2



Higher Restrictd Band-802.11b-high-chain0



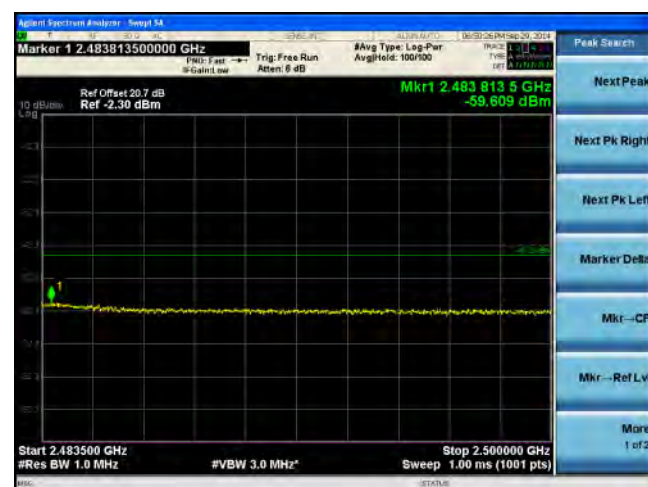
Higher Restrictd Band-802.11b-high-chain1



Higher Restrictd Band-802.11b-high-chain2



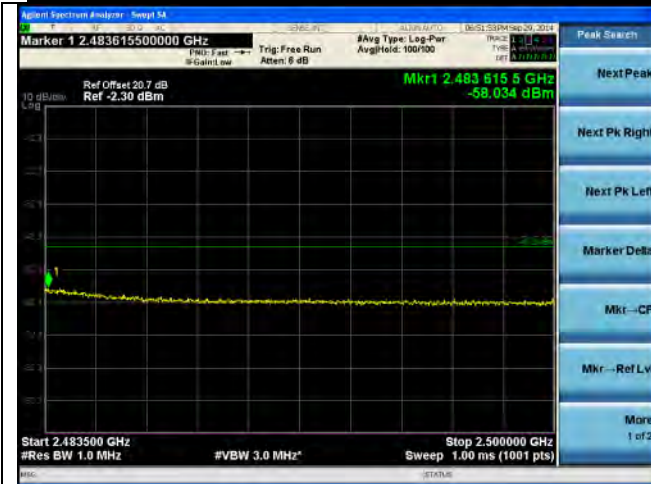
Higher Restrictd Band-802.11g-high-chain0



Higher Restrictd Band-802.11g-high-chain1



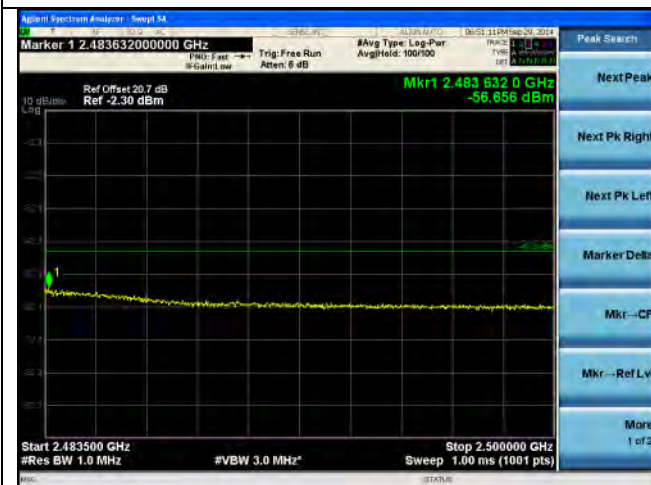
Higher Restrictd Band-802.11g-high-chain2



Higher Restrictred Band-802.11n-20-high-chain0



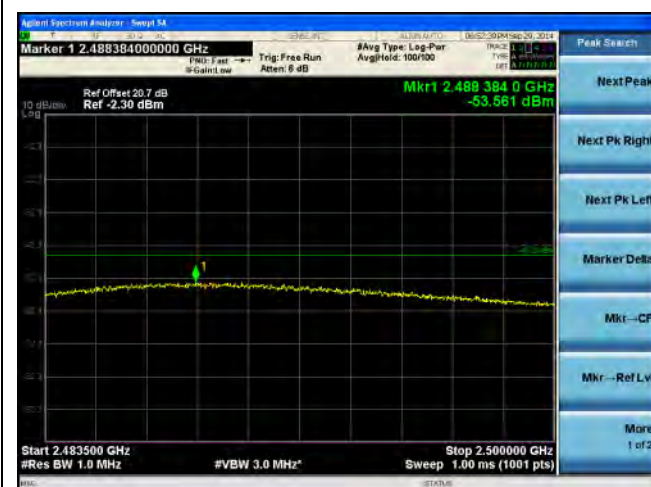
Higher Restrictred Band-802.11n-20-high-chain1



Higher Restrictred Band-802.11n-20-high-chain2



Higher Restrictred Band-802.11n-40-high-chain0



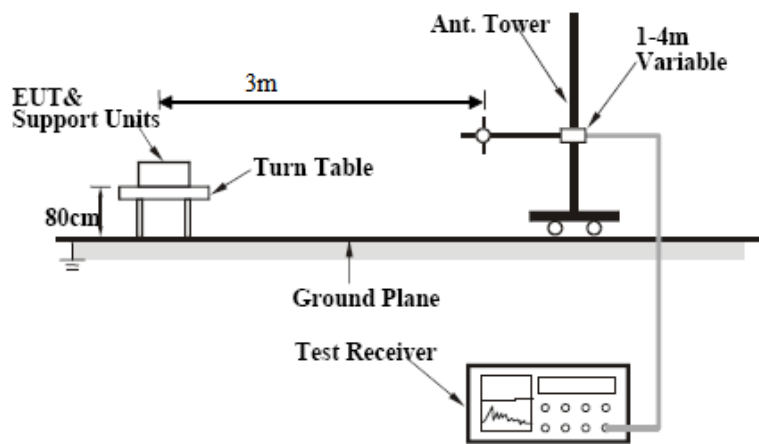
Higher Restrictred Band-802.11n-40-high-chain1



Higher Restrictred Band-802.11n-40-high-chain2

10.8 Radiated Emissions below 1GHz

Requirement(s):

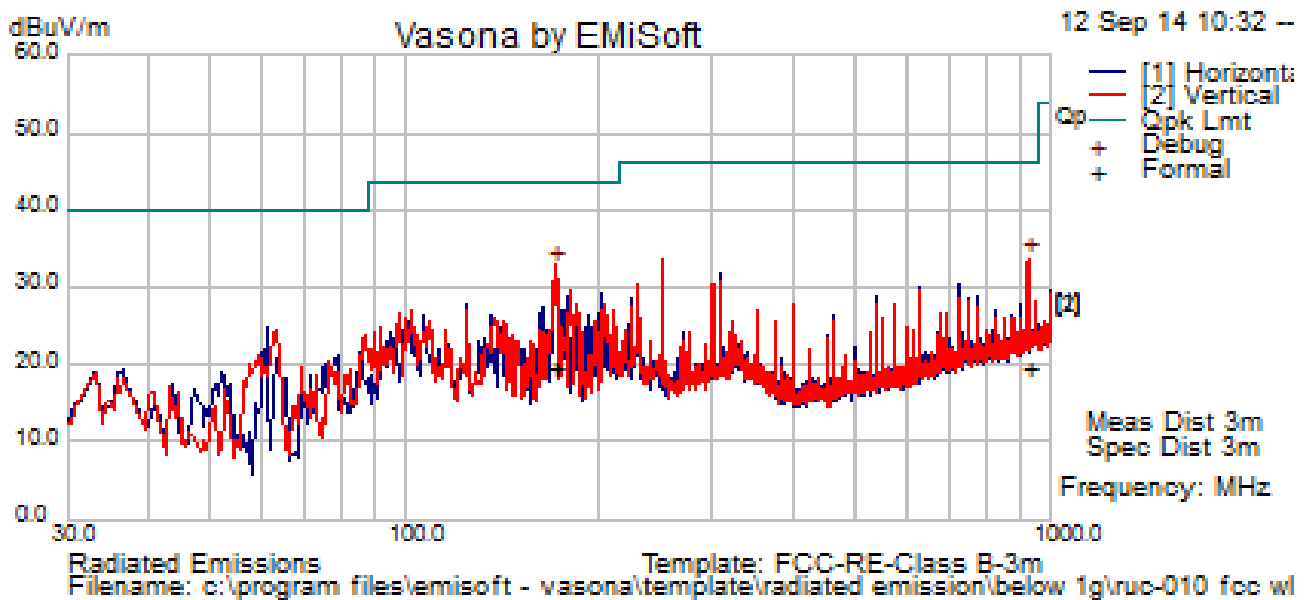
Spec	Item	Requirement	Applicable							
47CFR§15.247(d), RSS210(A8.5)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions 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>		Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960
Frequency range (MHz)	Field Strength (uV/m)									
30 – 88	100									
88 – 216	150									
216 960	200									
Above 960	500									
Test Setup										
Procedure	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. A Quasi-peak 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.									
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	below 1GHz			
Environmental Conditions:	Temp (°C):	26.1	Result	Pass
	Humidity (%)	47.5		
	Atmospheric (mbar):	1020		
Mains Power:	110VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	Sep 12, 2014			
Remarks:	N/A			

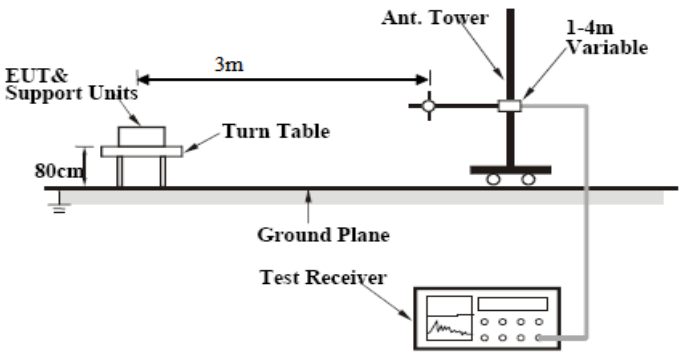


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
170.34	45.51	2.34	-28.28	19.58	Quasi Max	V	231.0	104.00	43.50	-23.92	Pass
924.16	30.82	5.04	-16.39	19.47	Quasi Max	V	198.0	282.00	46.00	-26.53	Pass

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

10.9 Radiated Spurious Emissions above 1GHz

Requirement(s):

Spec	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 ☒ 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	- 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: - 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. 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		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
Radiated Spurious Emission	1MHz	3MHz	1GHz - 25 GHz	Peak	Auto	Max hold	PK Measurement
Radiated Spurious Emission	1MHz	10Hz	1GHz - 25 GHz	Peak	Auto	Max hold	Ave Measurement

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Radiated Emission Test Results (Above 1GHz)

Above 1GHz-25GHz – 802.11b – 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
17999.64	40.35	7.02	14.46	61.83	Peak Max	V	189.00	153.00	74.00	-12.17	Pass
4830.91	29.07	3.18	0.14	32.39	Peak Max	H	205.00	231.00	74.00	-41.61	Pass
1000.00	37.75	0.92	14.86	53.54	Peak Max	V	328.00	101.00	74.00	-20.46	Pass
1494.75	29.43	1.42	-6.29	24.56	Peak Max	V	254.00	210.00	74.00	-49.44	Pass
1375.02	50.22	1.32	-6.48	45.06	Peak Max	V	142.00	275.00	74.00	-28.94	Pass
1121.09	36.10	1.07	-6.93	30.24	Peak Max	V	143.00	180.00	74.00	-43.76	Pass
17999.64	26.69	7.02	14.46	48.17	Average Max	V	189.00	153.00	54.00	-5.83	Pass
4830.91	17.36	3.18	0.14	20.68	Average Max	H	205.00	231.00	54.00	-33.32	Pass
1000.00	33.16	0.92	14.86	48.94	Average Max	V	328.00	101.00	54.00	-5.06	Pass
1494.75	15.51	1.42	-6.29	10.64	Average Max	V	254.00	210.00	54.00	-43.36	Pass
1375.02	42.75	1.32	-6.48	37.59	Average Max	V	142.00	275.00	54.00	-16.41	Pass
1121.09	22.41	1.07	-6.93	16.54	Average Max	V	143.00	180.00	54.00	-37.46	Pass

Above 1GHz-25GHz- 802.11b - 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
17923.12	40.10	7.01	14.21	61.31	Peak Max	H	311.00	203.00	74.00	-12.69	Pass
1000.00	37.47	0.92	14.86	53.25	Peak Max	H	265.00	221.00	74.00	-20.75	Pass
1375.12	50.48	1.32	-6.48	45.33	Peak Max	V	135.00	273.00	74.00	-28.67	Pass
4874.05	42.83	3.20	0.20	46.23	Peak Max	H	174.00	186.00	74.00	-27.77	Pass
1494.04	33.38	1.42	-6.29	28.51	Peak Max	H	133.00	110.00	74.00	-45.49	Pass
1621.45	30.65	1.56	-5.81	26.39	Peak Max	V	328.00	271.00	74.00	-47.61	Pass
17923.12	26.77	7.01	14.21	47.98	Average Max	H	311.00	203.00	54.00	-6.02	Pass
1000.00	32.81	0.92	14.86	48.59	Average Max	H	265.00	221.00	54.00	-5.41	Pass
1375.12	43.98	1.32	-6.48	38.83	Average Max	V	135.00	273.00	54.00	-15.17	Pass
4874.05	38.95	3.20	0.20	42.35	Average Max	H	174.00	186.00	54.00	-11.65	Pass
1494.04	20.15	1.42	-6.29	15.28	Average Max	H	133.00	110.00	54.00	-38.72	Pass
1621.45	17.33	1.56	-5.81	13.08	Average Max	V	328.00	271.00	54.00	-40.92	Pass

Above 1GHz-25GHz- 802.11b – 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
17998.59	40.21	7.02	14.46	61.69	Peak Max	V	289.00	72.00	74.00	-12.31	Pass
1000.00	35.66	0.92	14.86	51.44	Peak Max	H	214.00	231.00	74.00	-22.56	Pass
4924.49	40.71	3.21	0.26	44.19	Peak Max	V	103.00	48.00	74.00	-29.81	Pass
1494.86	35.37	1.42	-6.29	30.50	Peak Max	H	102.00	316.00	74.00	-43.50	Pass
1375.06	54.18	1.32	-6.48	49.02	Peak Max	V	119.00	309.00	74.00	-24.98	Pass
1622.47	24.79	1.56	-5.81	20.55	Peak Max	V	232.00	196.00	74.00	-53.45	Pass
17998.59	26.71	7.02	14.46	48.19	Average Max	V	289.00	72.00	54.00	-5.81	Pass
1000.00	31.69	0.92	14.86	47.47	Average Max	H	214.00	231.00	54.00	-6.53	Pass
4924.49	34.22	3.21	0.26	37.69	Average Max	V	103.00	48.00	54.00	-16.31	Pass
1494.86	21.96	1.42	-6.29	17.09	Average Max	H	102.00	316.00	54.00	-36.91	Pass
1375.06	47.96	1.32	-6.48	42.81	Average Max	V	119.00	309.00	54.00	-11.19	Pass
1622.47	11.19	1.56	-5.81	6.95	Average Max	V	232.00	196.00	54.00	-47.05	Pass

Above 1GHz-25GHz – 802.11g – 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
17981.38	40.22	7.01	14.40	61.63	Peak Max	V	174.00	64.00	74.00	-12.37	Pass
1000.00	34.54	0.92	14.86	50.32	Peak Max	H	101.00	185.00	74.00	-23.68	Pass
1121.09	35.83	1.07	-6.93	29.96	Peak Max	V	144.00	116.00	74.00	-44.04	Pass
1494.17	35.26	1.42	-6.29	30.39	Peak Max	V	111.00	116.00	74.00	-43.61	Pass
1623.68	36.34	1.56	-5.80	32.10	Peak Max	V	110.00	179.00	74.00	-41.90	Pass
1375.16	53.40	1.32	-6.48	48.25	Peak Max	V	116.00	276.00	74.00	-25.75	Pass
17981.38	26.91	7.01	14.40	48.33	Average Max	V	174.00	64.00	54.00	-5.67	Pass
1000.00	29.63	0.92	14.86	45.42	Average Max	H	101.00	185.00	54.00	-8.58	Pass
1121.09	22.44	1.07	-6.93	16.57	Average Max	V	144.00	116.00	54.00	-37.43	Pass
1494.17	22.08	1.42	-6.29	17.21	Average Max	V	111.00	116.00	54.00	-36.79	Pass
1623.68	23.16	1.56	-5.80	18.92	Average Max	V	110.00	179.00	54.00	-35.08	Pass
1375.16	46.96	1.32	-6.48	41.80	Average Max	V	116.00	276.00	54.00	-12.20	Pass

Above 1GHz-25GHz- 802.11g – 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
17932.24	40.09	7.01	14.24	61.34	Peak Max	H	193.00	250.00	74.00	-12.66	Pass
4875.07	29.93	3.20	0.20	33.32	Peak Max	V	201.00	236.00	74.00	-40.68	Pass
1495.19	36.63	1.42	-6.29	31.76	Peak Max	V	186.00	107.00	74.00	-42.24	Pass
1000.00	35.64	0.92	14.86	51.43	Peak Max	H	110.00	20.00	74.00	-22.57	Pass
1374.95	48.09	1.32	-6.48	42.93	Peak Max	V	160.00	274.00	74.00	-31.07	Pass
1623.70	40.25	1.56	-5.80	36.01	Peak Max	V	168.00	154.00	74.00	-37.99	Pass
17932.24	27.05	7.01	14.24	48.29	Average Max	H	193.00	250.00	54.00	-5.71	Pass
4875.07	15.79	3.20	0.20	19.19	Average Max	V	201.00	236.00	54.00	-34.81	Pass
1495.19	22.37	1.42	-6.29	17.51	Average Max	V	186.00	107.00	54.00	-36.49	Pass
1000.00	29.65	0.92	14.86	45.43	Average Max	H	110.00	20.00	54.00	-8.57	Pass
1374.95	41.28	1.32	-6.48	36.12	Average Max	V	160.00	274.00	54.00	-17.88	Pass
1623.70	26.13	1.56	-5.80	21.89	Average Max	V	168.00	154.00	54.00	-32.11	Pass

Above 1GHz-25GHz- 802.11g - 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
17932.75	39.84	7.01	14.24	61.09	Peak Max	V	321.00	360.00	74.00	-12.91	Pass
4928.16	46.04	3.21	0.26	49.51	Peak Max	V	100.00	210.00	74.00	-24.49	Pass
1492.65	32.14	1.42	-6.29	27.27	Peak Max	V	203.00	90.00	74.00	-46.73	Pass
1000.00	31.71	0.92	14.86	47.49	Peak Max	H	132.00	184.00	74.00	-26.51	Pass
1375.12	38.30	1.32	-6.48	33.15	Peak Max	V	168.00	270.00	74.00	-40.85	Pass
1622.38	26.11	1.56	-5.81	21.87	Peak Max	V	318.00	153.00	74.00	-52.13	Pass
17932.75	26.72	7.01	14.24	47.97	Average Max	V	321.00	360.00	54.00	-6.03	Pass
4928.16	31.87	3.21	0.26	35.35	Average Max	V	100.00	210.00	54.00	-18.65	Pass
1492.65	19.02	1.42	-6.29	14.14	Average Max	V	203.00	90.00	54.00	-39.86	Pass
1000.00	28.74	0.92	14.86	44.53	Average Max	H	132.00	184.00	54.00	-9.47	Pass
1375.12	30.67	1.32	-6.48	25.51	Average Max	V	168.00	270.00	54.00	-28.49	Pass
1622.38	35.12	1.56	-5.81	30.88	Average Max	V	318.00	153.00	54.00	-23.12	Pass

Above 1GHz-25GHz – 802.11n-20M – 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
17958.55	40.09	7.01	14.33	61.42	Peak Max	H	188.00	77.00	74.00	-12.58	Pass
1000.00	32.77	0.92	14.86	48.55	Peak Max	H	257.00	186.00	74.00	-25.45	Pass
1374.99	53.27	1.32	-6.48	48.12	Peak Max	V	117.00	274.00	74.00	-25.88	Pass
1492.96	33.64	1.42	-6.29	28.77	Peak Max	V	125.00	44.00	74.00	-45.23	Pass
1623.73	37.68	1.56	-5.80	33.44	Peak Max	V	181.00	161.00	74.00	-40.56	Pass
1120.28	34.10	1.07	-6.94	28.23	Peak Max	H	184.00	153.00	74.00	-45.77	Pass
17958.55	26.78	7.01	14.33	48.11	Average Max	H	188.00	77.00	54.00	-5.89	Pass
1000.00	26.85	0.92	14.86	42.64	Average Max	H	257.00	186.00	54.00	-11.36	Pass
1374.99	46.71	1.32	-6.48	41.55	Average Max	V	117.00	274.00	54.00	-12.45	Pass
1492.96	19.97	1.42	-6.29	15.10	Average Max	V	125.00	44.00	54.00	-38.90	Pass
1623.73	24.17	1.56	-5.80	19.93	Average Max	V	181.00	161.00	54.00	-34.07	Pass
1120.28	20.78	1.07	-6.94	14.91	Average Max	H	184.00	153.00	54.00	-39.09	Pass

Above 1GHz-25GHz- 802.11n-20M - 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
17795.96	40.25	6.99	13.78	61.02	Peak Max	V	185.00	184.00	74.00	-12.98	Pass
1492.00	34.05	1.42	-6.29	29.18	Peak Max	V	134.00	183.00	74.00	-44.82	Pass
4868.11	47.46	3.20	0.19	50.84	Peak Max	V	101.00	222.00	74.00	-23.16	Pass
1000.00	35.33	0.92	14.86	51.11	Peak Max	H	158.00	184.00	74.00	-22.89	Pass
1620.27	28.47	1.56	-5.81	24.21	Peak Max	V	232.00	175.00	74.00	-49.79	Pass
1375.13	54.30	1.32	-6.48	49.15	Peak Max	V	111.00	275.00	74.00	-24.85	Pass
17795.96	26.75	6.99	13.78	47.52	Average Max	V	185.00	184.00	54.00	-6.48	Pass
1492.00	20.72	1.42	-6.29	15.85	Average Max	V	134.00	183.00	54.00	-38.15	Pass
4868.11	32.45	3.20	0.19	35.83	Average Max	V	101.00	222.00	54.00	-18.17	Pass
1000.00	29.88	0.92	14.86	45.67	Average Max	H	158.00	184.00	54.00	-8.33	Pass
1620.27	15.00	1.56	-5.81	10.74	Average Max	V	232.00	175.00	54.00	-43.26	Pass
1375.13	47.54	1.32	-6.48	42.38	Average Max	V	111.00	275.00	54.00	-11.62	Pass

Above 1GHz-25GHz- 802.11b – 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
17864.94	40.24	7.00	14.01	61.25	Peak Max	H	265.00	264.00	74.00	-12.75	Pass
4917.31	53.52	3.21	0.25	56.98	Peak Max	V	100.00	232.00	74.00	-17.02	Pass
1000.00	32.43	0.92	14.86	48.22	Peak Max	H	117.00	187.00	74.00	-25.78	Pass
1375.14	51.65	1.32	-6.48	46.50	Peak Max	V	125.00	274.00	74.00	-27.50	Pass
1494.45	31.76	1.42	-6.29	26.89	Peak Max	V	162.00	346.00	74.00	-47.11	Pass
1119.15	36.52	1.06	-6.94	30.65	Peak Max	H	183.00	333.00	74.00	-43.35	Pass
17864.94	26.73	7.00	14.01	47.74	Average Max	H	265.00	264.00	54.00	-6.26	Pass
4917.31	35.12	3.21	0.25	38.58	Average Max	V	100.00	232.00	54.00	-15.42	Pass
1000.00	29.05	0.92	14.86	44.83	Average Max	H	117.00	187.00	54.00	-9.17	Pass
1375.14	45.19	1.32	-6.48	40.03	Average Max	V	125.00	274.00	54.00	-13.97	Pass
1494.45	18.67	1.42	-6.29	13.80	Average Max	V	162.00	346.00	54.00	-40.20	Pass
1119.15	22.69	1.06	-6.94	16.82	Average Max	H	183.00	333.00	54.00	-37.18	Pass

Above 1GHz-25GHz – 802.11n-40M – 2422MHz

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
17940.35	40.90	7.01	14.26	62.17	Peak Max	H	100.00	244.00	74.00	-11.83	Pass
1000.00	36.60	0.92	14.86	52.39	Peak Max	H	109.00	185.00	74.00	-21.61	Pass
1493.87	36.07	1.42	-6.29	31.20	Peak Max	H	126.00	72.00	74.00	-42.80	Pass
1375.07	54.94	1.32	-6.48	49.78	Peak Max	V	117.00	277.00	74.00	-24.22	Pass
1121.20	34.90	1.07	-6.93	29.03	Peak Max	H	126.00	168.00	74.00	-44.97	Pass
1623.74	37.16	1.56	-5.80	32.92	Peak Max	V	99.00	293.00	74.00	-41.08	Pass
17940.35	27.00	7.01	14.26	48.27	Average Max	H	100.00	244.00	54.00	-5.73	Pass
1000.00	31.34	0.92	14.86	47.13	Average Max	H	109.00	185.00	54.00	-6.87	Pass
1493.87	22.49	1.42	-6.29	17.62	Average Max	H	126.00	72.00	54.00	-36.38	Pass
1375.07	48.33	1.32	-6.48	43.17	Average Max	V	117.00	277.00	54.00	-10.83	Pass
1121.20	21.82	1.07	-6.93	15.95	Average Max	H	126.00	168.00	54.00	-38.05	Pass
1623.74	23.62	1.56	-5.80	19.38	Average Max	V	99.00	293.00	54.00	-34.62	Pass

Above 1GHz-25GHz- 802.11n-40M – 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
17998.88	40.35	7.02	14.46	61.82	Peak Max	V	124.00	298.00	74.00	-12.18	Pass
1000.00	36.10	0.92	14.86	51.88	Peak Max	H	110.00	184.00	74.00	-22.12	Pass
1375.01	54.30	1.32	-6.48	49.15	Peak Max	V	103.00	274.00	74.00	-24.85	Pass
4910.80	27.09	3.21	0.24	30.54	Peak Max	V	257.00	15.00	74.00	-43.46	Pass
1493.77	27.72	1.42	-6.29	22.85	Peak Max	H	254.00	130.00	74.00	-51.15	Pass
1622.00	36.48	1.56	-5.81	32.23	Peak Max	V	100.00	194.00	74.00	-41.77	Pass
17998.88	26.92	7.02	14.46	48.39	Average Max	V	124.00	298.00	54.00	-5.61	Pass
1000.00	31.10	0.92	14.86	46.88	Average Max	H	110.00	184.00	54.00	-7.12	Pass
1375.01	47.58	1.32	-6.48	42.42	Average Max	V	103.00	274.00	54.00	-11.58	Pass
4910.80	13.87	3.21	0.24	17.32	Average Max	V	257.00	15.00	54.00	-36.68	Pass
1493.77	14.30	1.42	-6.29	9.43	Average Max	H	254.00	130.00	54.00	-44.57	Pass
1622.00	23.49	1.56	-5.81	19.24	Average Max	V	100.00	194.00	54.00	-34.76	Pass

Above 1GHz-25GHz- 802.11n-40M - 2452MHz

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
17949.58	39.96	7.01	14.30	61.27	Peak Max	V	313.00	97.00	74.00	-12.73	Pass
4916.93	50.60	3.21	0.25	54.06	Peak Max	V	99.00	232.00	74.00	-19.94	Pass
1000.00	35.72	0.92	14.86	51.50	Peak Max	H	100.00	186.00	74.00	-22.50	Pass
1494.67	32.97	1.42	-6.29	28.11	Peak Max	V	106.00	148.00	74.00	-45.89	Pass
1374.91	51.39	1.32	-6.48	46.24	Peak Max	V	111.00	276.00	74.00	-27.76	Pass
1623.61	35.93	1.56	-5.80	31.69	Peak Max	V	174.00	194.00	74.00	-42.31	Pass
17949.58	26.74	7.01	14.30	48.04	Average Max	V	313.00	97.00	54.00	-5.96	Pass
4916.93	36.36	3.21	0.25	39.82	Average Max	V	99.00	232.00	54.00	-14.18	Pass
1000.00	30.62	0.92	14.86	46.40	Average Max	H	100.00	186.00	54.00	-7.60	Pass
1494.67	16.63	1.42	-6.29	11.77	Average Max	V	106.00	148.00	54.00	-42.23	Pass
1374.91	44.51	1.32	-6.48	39.35	Average Max	V	111.00	276.00	54.00	-14.65	Pass
1623.61	22.88	1.56	-5.80	18.63	Average Max	V	174.00	194.00	54.00	-35.37	Pass

Above 1GHz-25GHz- Collocation testing (2.4GHz WLAN & 5GHz WLAN on the main-board transmitting simultaneously)

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
3602.84	38.62	2.76	-0.20	41.19	Peak Max	H	166.00	293.00	74.00	-32.81	Pass
3602.84	25.18	2.76	-0.20	27.74	Average Max	H	166.00	293.00	54.00	-26.26	Pass
10629.33	36.41	5.05	5.98	47.43	Peak Max	V	148.00	4.00	74.00	-26.57	Pass
10629.33	23.74	5.05	5.98	34.77	Average Max	V	148.00	4.00	54.00	-19.23	Pass
1262.42	58.40	1.24	-6.42	53.23	Peak Max	H	173.00	184.00	68.30	-15.07	Pass
3791.20	39.39	2.82	-0.20	42.02	Peak Max	H	174.00	308.00	74.00	-31.98	Pass
3791.20	25.69	2.82	-0.20	28.31	Average Max	H	174.00	308.00	54.00	-25.69	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
R&S LISN	ESH2-Z5	861741/013	05/18/2014	1 Year	05/18/2015	☒
CHASE LISN	MN2050B	1018	07/24/2014	1 Year	07/24/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
Radiated Emissions						
R & S Receiver	ESL6	100178	03/01/2014	1 Year	03/01/2015	☒
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
ETS-Lingren Loop Antenna	6512	00049120	05/13/2014	1 Year	05/13/2015	☐
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	07/03/2014	1 Year	07/03/2015	☒
Horn Antenna (1-26.5GHz)	3115	10SL0059	04/26/2014	1 Year	04/26/2015	☒
Horn Antenna (18-40 GHz)	AH-840	101013	04/23/2014	1 Year	04/23/2015	☒
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/30/2014	1 Year	05/30/2015	☒
Microwave Preamplifier (18-40 GHz)	PA-840	181251	05/30/2014	1 Year	05/30/2015	☒
3 Meters SAC	3M	N/A	10/13/2013	1 Year	10/13/2014	☒
10 Meters SAC	10M	N/A	06/05/2014	1 Year	06/05/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY50210206	05/30/2014	1 Year	05/30/2015	☒
Spectrum Analyzer	E4407B	US88441016	05/31/2014	1 Year	05/31/2015	☐
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒

Annex B. USER MANUAL, BLOCK & CIRCUIT DIAGRAM

Please see attachment

Annex C. 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		Radio: A1. Terminal equipment for purpose of calling 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 KN22: Test Method for EMI 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 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 C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4 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 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