RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: RF_FCC_SL19011103-SEV-111R2_W5356_REV_1.0
Supersede Report No.: RF_FCC_IC_SL19011103-SEV-111R2_W5356

Applicant	:	Trilliant Networks, Inc.
Product Name	:	SecureMesh WAN Connector
Model No.	:	CONN-2000
Test Standard	:	47CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	TMB-CONN2000
Dates of test	:	02/25/2019 - 04/04/2019
Issue Date	:	08/16/2019
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X] Equipment did not comply with the specification [ ]		

This Test Report is Issued Under the Authority of:	
Gary Chou	
Gary Chou	Chen Ge
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
775 Montague Expressway, Milpitas, 95035 CA

ilac-MRA
A2LA ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & RED
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
RF_FCC_IC_SL19011103-SEV-111R2_W5356	None	Original	04/05/2019
RF_FCC_SL19011103-SEV-111R2_W5356_REV_1.0	REV_1.0	Update Frequency info	08/16/2019

2 Executive Summary

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

Company: Trilliant Networks, Inc.
Product: SecureMesh WAN Connector
Model: CONN-2000

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	:	Trilliant Networks
Applicant Address	:	401 Harrison Oaks Blvd., Suite 300 Cary, NC 27513
Manufacturer Name	:	Trilliant Networks
Manufacturer Address	:	401 Harrison Oaks Blvd., Suite 300 Cary, NC 27513

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	540430
IC Test Site No.	4842D
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	SecureMesh WAN Connector
Model No.	CONN-2000
Trade Name	Trilliant
Serial No.	FC00000002
Input Power	48VDC (PoE)
Date of EUT received	02/06/2019
Equipment Class/ Category	UNII
Port/Connectors	PoE, Ethernet

6.2 Radio Description

Radio Type	802.11a	802.11n20	802.11n40
Operating Frequency	5260-5320MHz 5500-5700MHz	5260-5320MHz 5500-5700MHz	5270-5310MHz 5510-5670MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz	20MHz	40MHz
Number of Channels	16	16	6
Antenna Type	Panel/Directional		
Antenna Gain (Peak)	16.2 dBi (band 3), 13.0 dBi (band 2)		
Antenna Connector Type	MMCX		
Note	1. This is a Outdoor device. Non-beamingform, no TPC. 2. 802.11n20/40 is 2x2 MIMO configuration. 3. Operation in the 5.250 – 5.350 and 5.470 – 5.725 bands are allowed as a DFS Master device. 4. 2.4GHz and 5GHz Radio transmit simultaneously.		

EUT Power level setting:

Mode	Frequency	Power Setting
802.11-a	5260	12
802.11-a	5280	12
802.11-a	5320	12
802.11-n-20	5260	11
802.11-n-20	5280	11
802.11-n-20	5320	11
802.11-n-40	5270	11
802.11-n-40	5310	11
802.11-a	5500	12
802.11-a	5580	12
802.11-a	5700	12
802.11-n-20	5500	7
802.11-n-20	5580	7
802.11-n-20	5700	7
802.11-n-40	5510	7
802.11-n-40	5550	7
802.11-n-40	5670	7

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	N17Q1	NXGNPAA0167300AA597600	Acer	N/A
2	POE Adapter	740-64214-001	N/A	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	
1	EUT	RJ45	POE	RJ45	10	N/A	-
2	POE	RJ45	Laptop	RJ45	1	N/A	-

7.3 Test Software Description

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

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Antenna Requirement	FCC	15.203	ANSI C63.10 - 2013 558074 D01 15.247 Meas. Guidance v05	☒ Pass ☐ N/A
	-	-		
Restricted Band of Operation	FCC	15.205	ANSI C63.10: 2013 789033 D01 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.10: 2013	☒ Pass ☐ N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC	15.407	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Maximum conducted Output Power	FCC	15.407	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power reduction (Antenna Gain > 6 dBi)	FCC/IC	15.407	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Band Edge and Radiated Spurious Emissions	FCC/IC	15.407	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power Spectral Density	FCC/IC	15.407	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Frequency Stability	FCC/IC	15.407	789033 D01 General UNII Test Procedures New Rules v01	☐ Pass ☒ N/A
Transmit Power Control (TPC)	FCC/IC	15.407	789033 D01 General UNII Test Procedures New Rules v01	☐ Pass ☒ 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

9.1 Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					6.0118262

The total derived measurement uncertainty is +/- 6.00 dB.

9.2 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					8.4726

The total derived measurement uncertainty is +/- 8.47 dB.

9.3 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					0.952174

The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

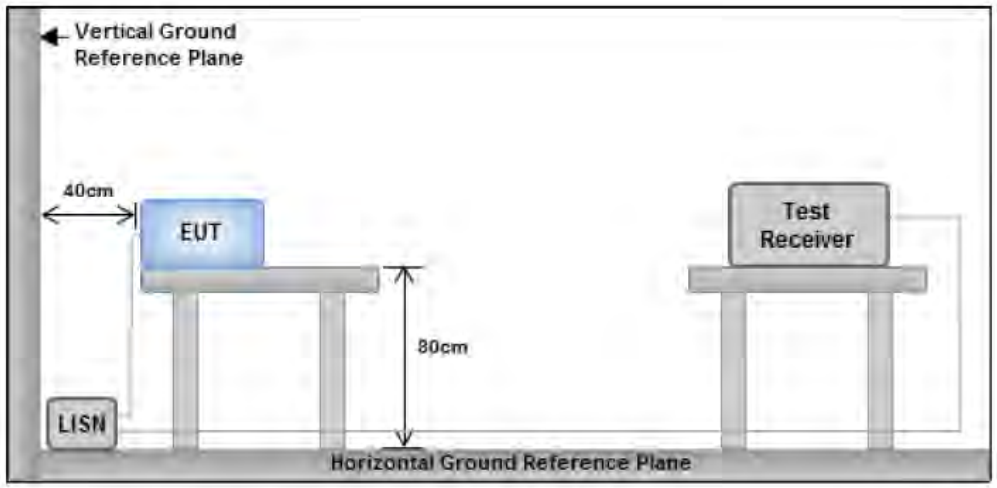
10.1 Antenna Requirement

Spec	Requirement	Applicable
§15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) Antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.	☒
Remark	The EUT uses MMCX connector for antenna connection which meet the requirement.	
Result	☒ PASS ☐ FAIL	

10.2 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 µH/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 80 cm from EUT and at least 80 cm from other units and other metal planes		
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 120V 60Hz		
Result	☒ Pass ☐ Fail		

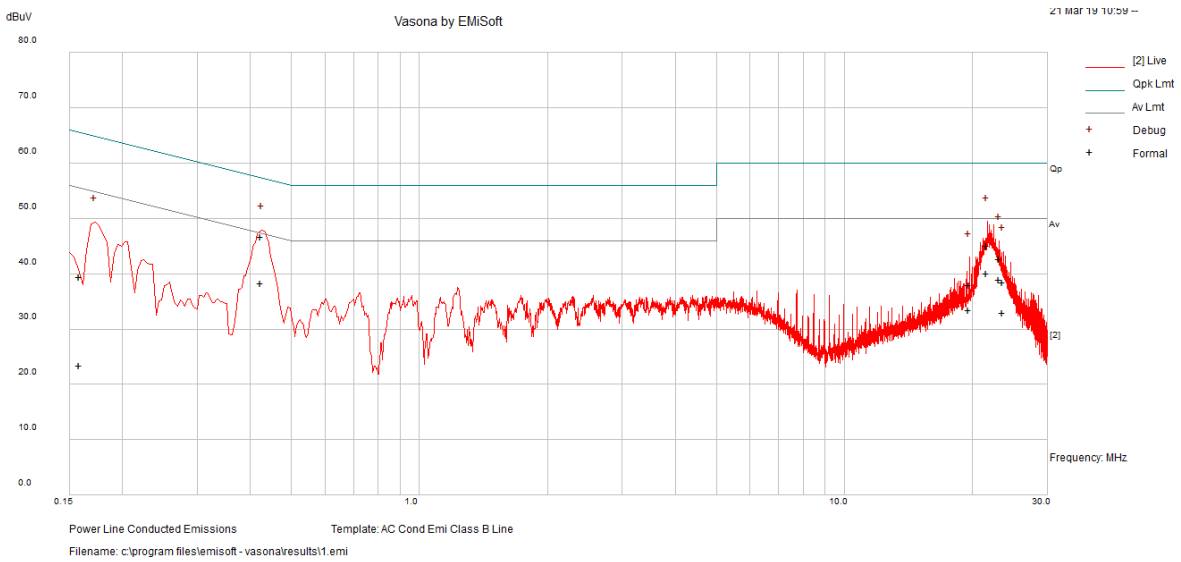
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at RF test site.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Gary Chou			
Test Date:	03/21/2019			
Remarks	Line			

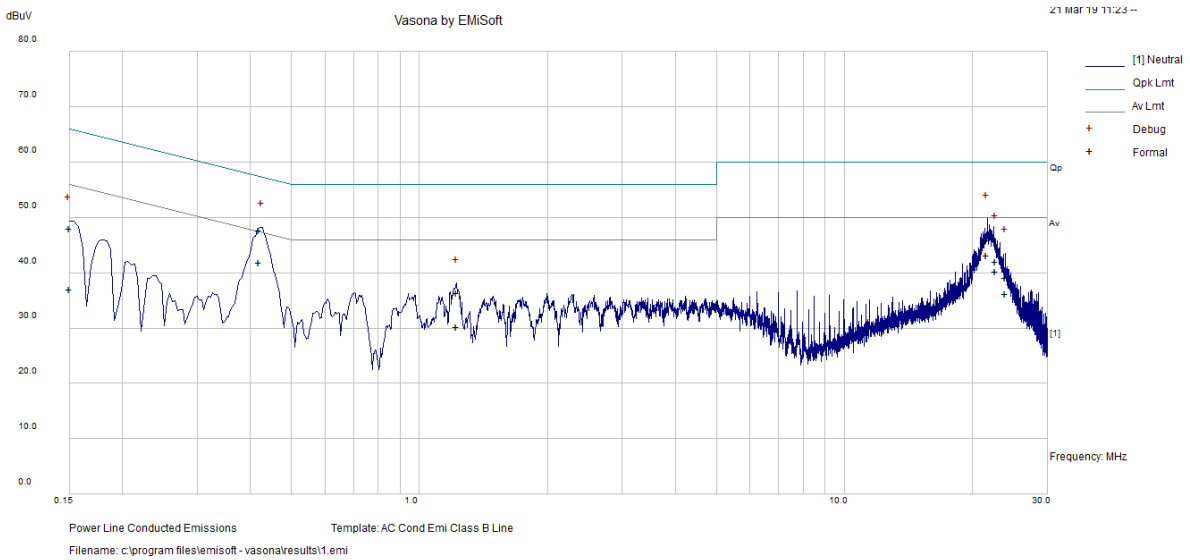


Live Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.423367	39.37	7.32	0.04	46.73	Quasi Peak	Line	57.38	-10.65	Pass
21.68327	35.62	8.97	0.49	45.08	Quasi Peak	Line	60	-14.92	Pass
23.18241	33.17	9	0.51	42.69	Quasi Peak	Line	60	-17.31	Pass
0.158621	32.34	7.12	0.05	39.51	Quasi Peak	Line	65.54	-26.03	Pass
23.68323	28.9	9	0.52	38.42	Quasi Peak	Line	60	-21.58	Pass
19.69851	28.55	8.93	0.45	37.93	Quasi Peak	Line	60	-22.07	Pass
0.423367	30.93	7.32	0.04	38.29	Average	Line	47.38	-9.09	Pass
21.68327	30.58	8.97	0.49	40.04	Average	Line	50	-9.96	Pass
23.18241	29.41	9	0.51	38.93	Average	Line	50	-11.07	Pass
0.158621	16.19	7.12	0.05	23.36	Average	Line	55.54	-32.17	Pass
23.68323	23.45	9	0.52	32.97	Average	Line	50	-17.03	Pass
19.69851	24.02	8.93	0.45	33.41	Average	Line	50	-16.59	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Gary Chou			
Test Date:	03/21/2019			
Remarks	Neutral			

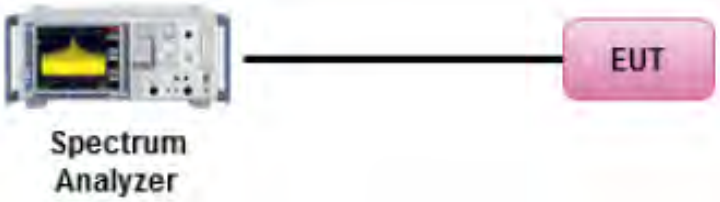


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.419182	40.29	7.31	0.04	47.64	Quasi Peak	Neutral	57.46	-9.82	Pass
21.70176	36.52	8.97	0.49	45.98	Quasi Peak	Neutral	60	-14.02	Pass
22.70113	32.5	9	0.51	42.01	Quasi Peak	Neutral	60	-17.99	Pass
23.94757	29.65	9	0.53	39.17	Quasi Peak	Neutral	60	-20.83	Pass
0.150099	40.95	7.11	0.05	48.11	Quasi Peak	Neutral	65.99	-17.89	Pass
1.225214	28.62	7.74	0.05	36.41	Quasi Peak	Neutral	56	-19.59	Pass
0.419182	34.54	7.31	0.04	41.9	Average	Neutral	47.46	-5.57	Pass
21.70176	33.77	8.97	0.49	43.23	Average	Neutral	50	-6.77	Pass
22.70113	30.68	9	0.51	40.19	Average	Neutral	50	-9.81	Pass
23.94757	26.65	9	0.53	36.17	Average	Neutral	50	-13.83	Pass
0.150099	29.95	7.11	0.05	37.11	Average	Neutral	55.99	-18.88	Pass
1.225214	22.43	7.74	0.05	30.22	Average	Neutral	46	-15.78	Pass

10.3 6dB & 26dB Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	-	26 dB Emission BW: Report only for reference.	☒
		6 dB Emission BW: Report only for reference(Cross Band)	☒
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	☐
Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01 26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz) - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. o Set RBW = around 1% of emission bandwidth o Set VBW > RBW o Detector = Peak o Trace mode = max hold - Allow the trace to stabilize. - Capture the plot. - Repeat above steps for different test channel and other modulation type. - 6dB Emission bandwidth measurement procedure - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. o Set RBW = 100kHz o Set VBW > 3RBW o Detector = Peak o Trace mode = max hold - Allow the trace to stabilize. - Capture the plot. - Repeat above steps for different test channel and other modulation type.		
Test Date	04/04/2019	Environmental condition	Temperature 23ºC Relative Humidity 42% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

Test was done by Rachana Khanduri at RF test site.

26dB Bandwidth measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5260	Low	19.949
	802.11a	5280	Mid	20.682
	802.11a	5320	High	20.117
	802.11n-20	5260	Low	21.620
	802.11n-20	5280	Mid	20.864
	802.11n-20	5320	High	21.194
	802.11n-40	5270	Low	43.478
	802.11n-40	5310	High	42.842

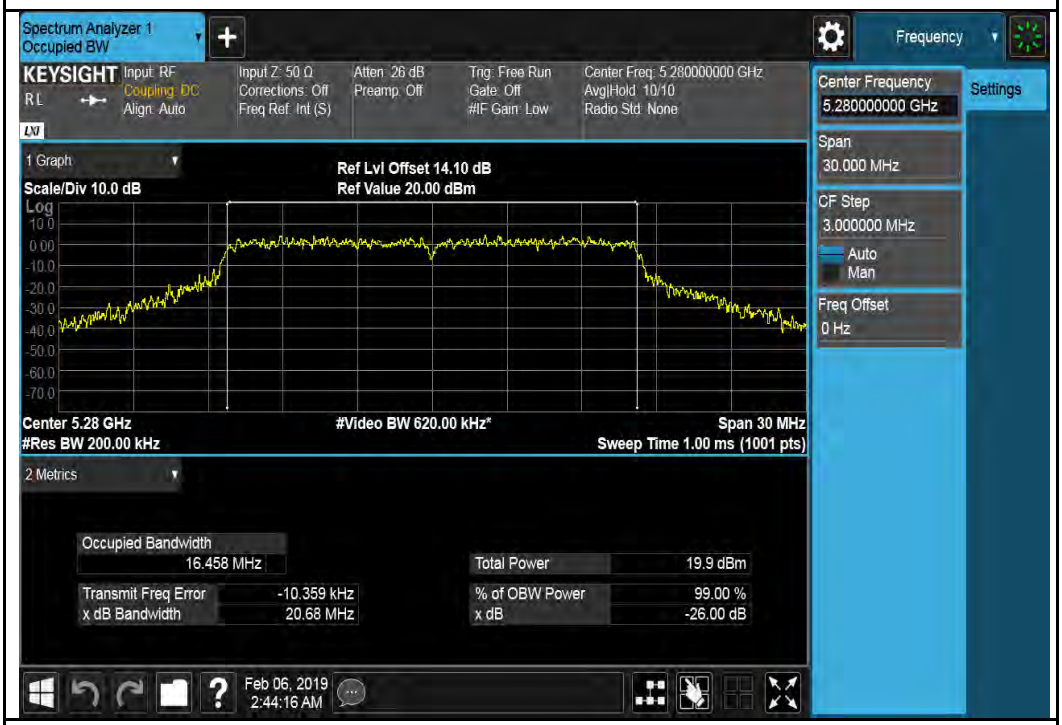
26dB Bandwidth measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5500	Low	20.320
	802.11a	5580	Mid	19.883
	802.11a	5700	High	20.390
	802.11n-20	5500	Low	20.192
	802.11n-20	5580	Mid	20.959
	802.11n-20	5700	High	21.373
	802.11n-40	5510	Low	44.088
	802.11n-40	5590	Mid	42.709
	802.11n-40	5670	High	44.473

26dB Bandwidth Test Plots:

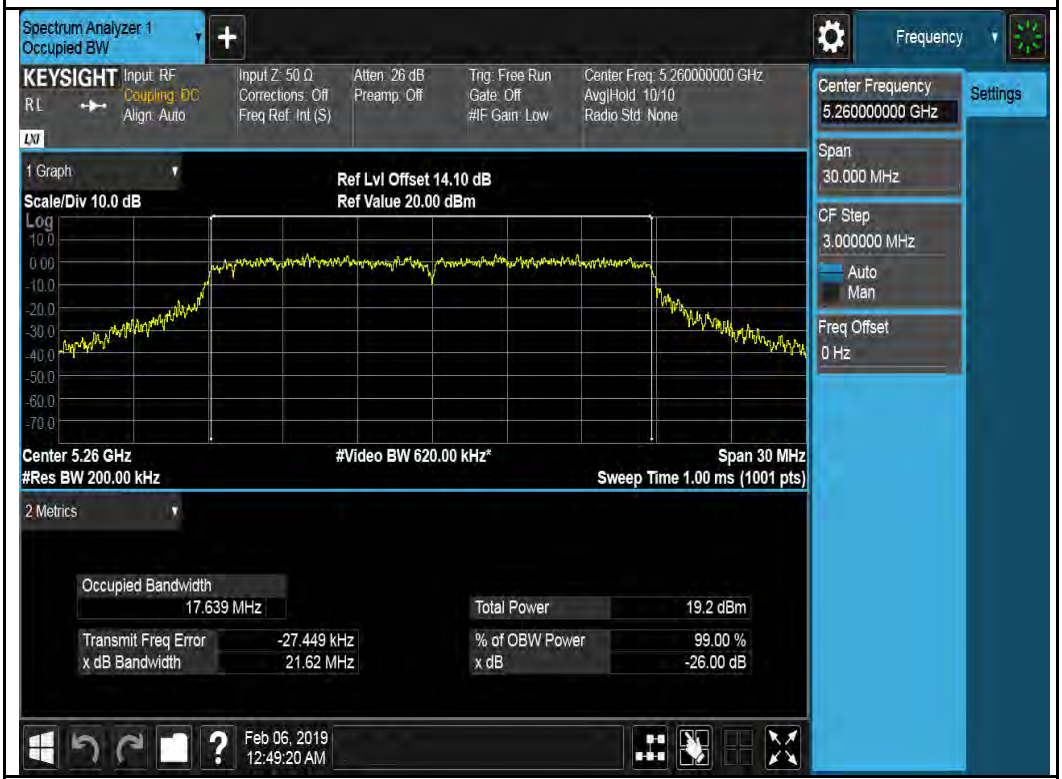
W53:

802.11a-5260MHz



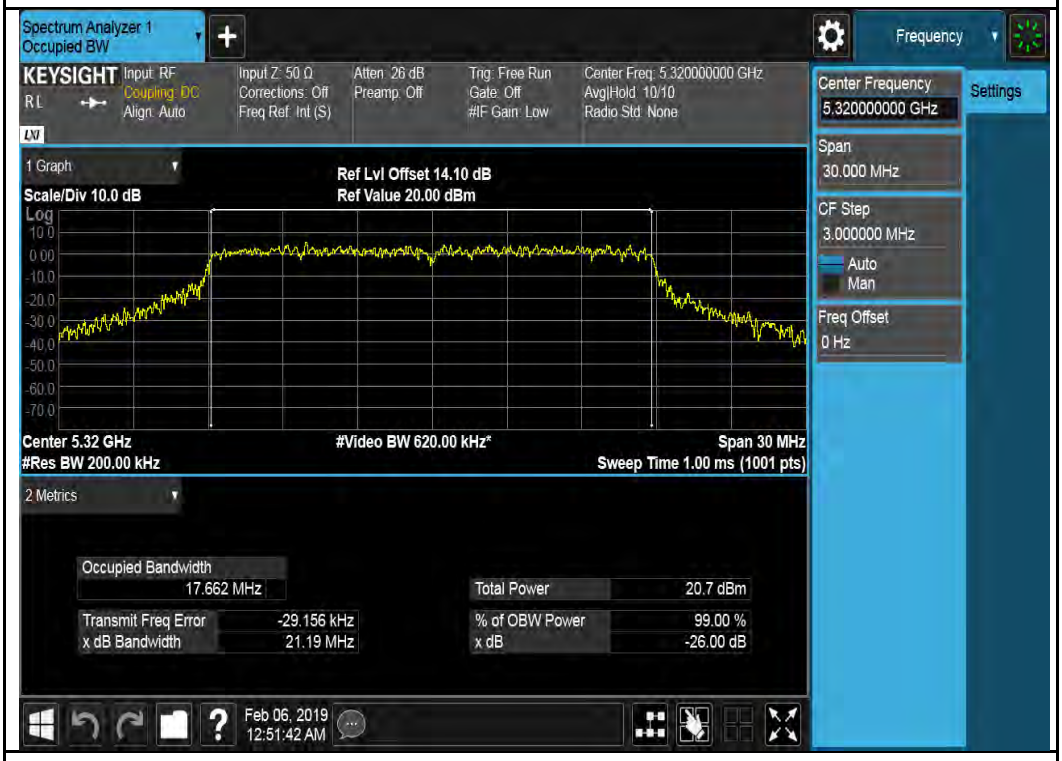
802.11a-5280MHz

802.11a-5320MHz



802.11n20-5260MHz

802.11n20-5280MHz



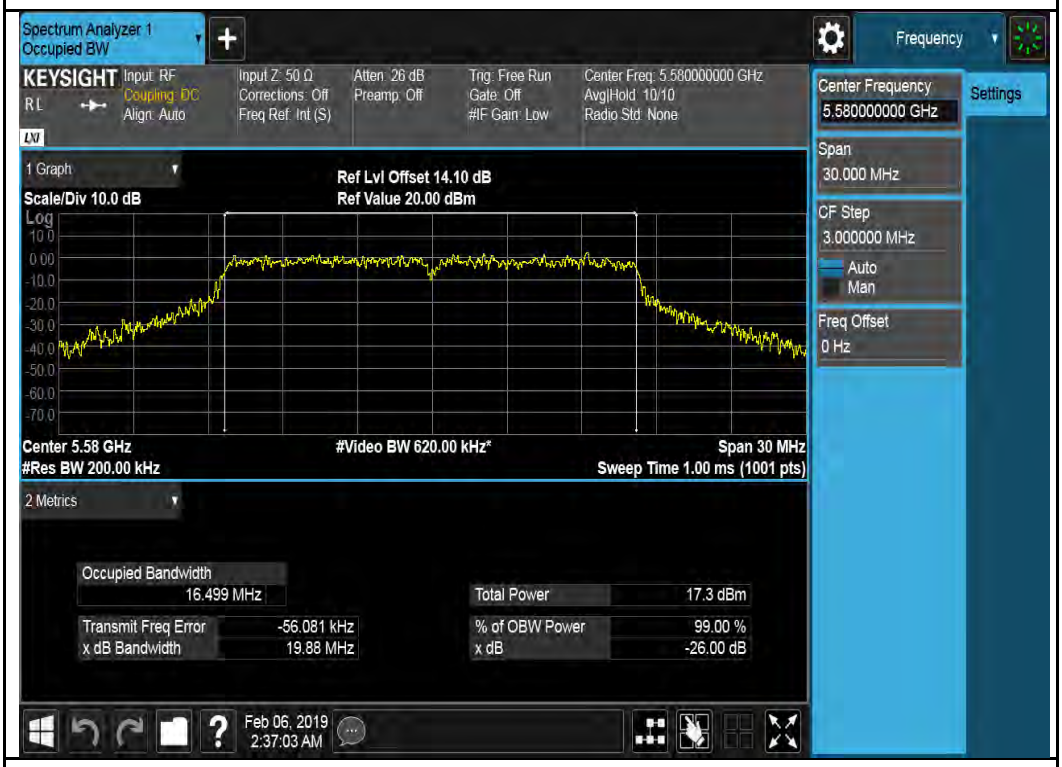
802.11n20-5320MHz

802.11n40-5270MHz

802.11n40-5310MHz

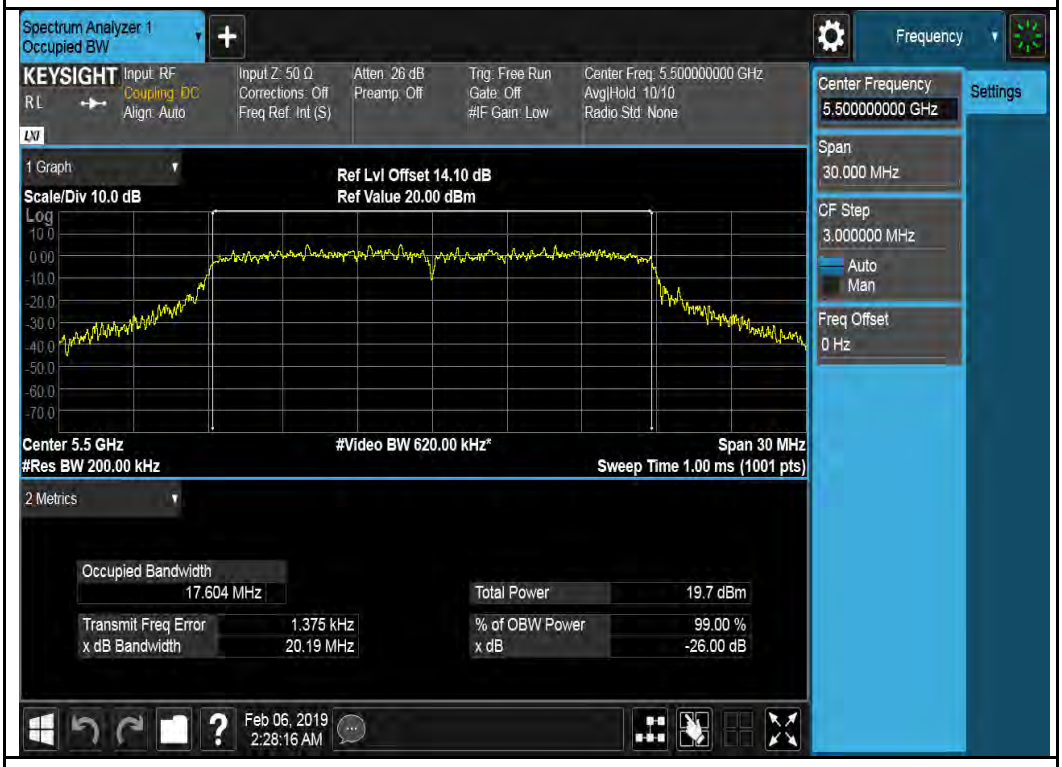
W56:

802.11a-5500MHz



802.11a-5580MHz

802.11a-5700MHz

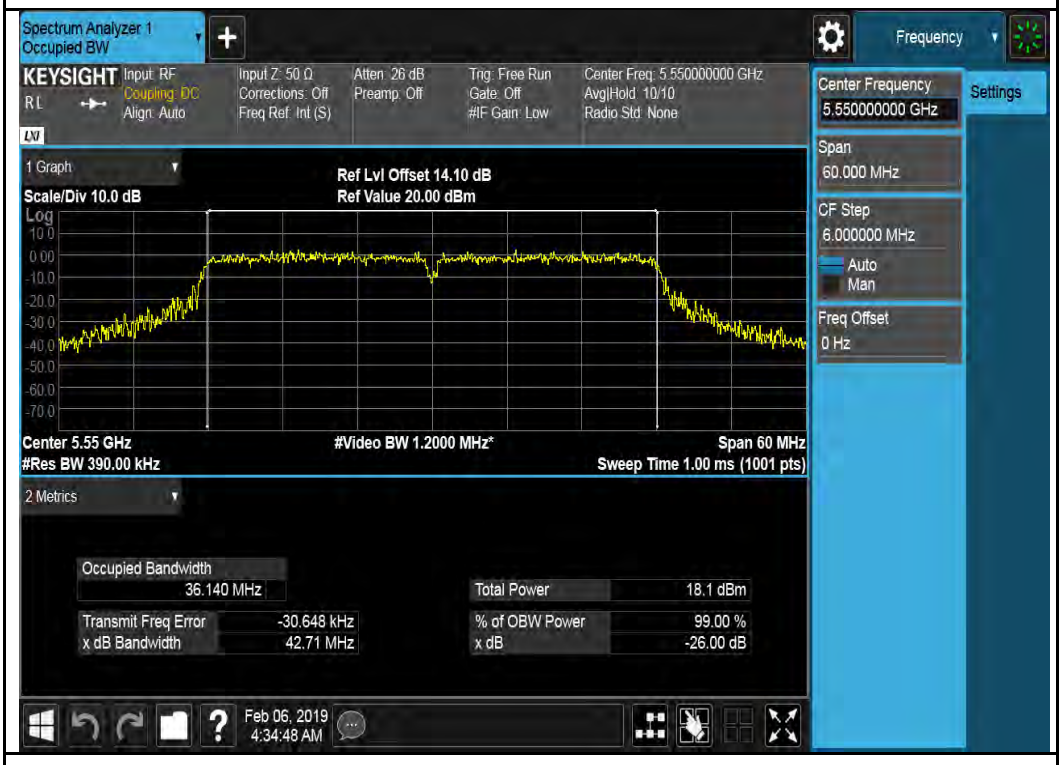


802.11n20-5500MHz

802.11n20-5580MHz

802.11n20-5700MHz

802.11n40-5510MHz



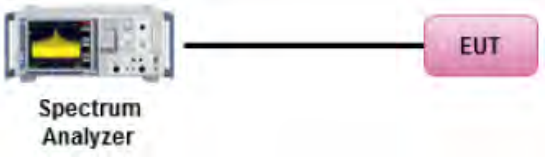
802.11n40-5550MHz

802.11n40-5670MHz

10.4 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	☒

Test Setup				
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01r02 Measurement using a Spectrum Analyzer or EMI Receiver (SA) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): - 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 - Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.) - Sweep time = auto. - Detector = power averaging (rms), if available. Otherwise, use sample detector mode. - If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.” - Trace average at least 100 traces in power averaging (rms) mode. - Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.			
Test Date	04/04/2019	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	23ºC 44% 1021mbar
Remark	802.11a is SISO and only 802.11n20/40 is 2x2 MIMO configuration. The EUT has 2 antennas with 1 vertical and 1 horizontal, individual gain = 13dBi(Band 2), 16.2dBi(Band 3).			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at RF test site.

§ 15.407 Output Power measurement result for 5.3GHz :

Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
			Chain 0	Chain 1	Total		
802.11a	5260	Low	11.770	-	11.770	16.98	Pass
	5280	Mid	10.130	-	10.130	16.98	Pass
	5320	High	10.870	-	10.870	16.98	Pass
802.11n-20	5260	Low	9.673	10.262	12.988	16.98	Pass
	5280	Mid	9.402	9.933	12.686	16.98	Pass
	5320	High	10.053	10.530	13.308	16.98	Pass
802.11n-40	5270	Low	10.326	10.708	13.531	16.98	Pass
	5310	Mid	10.101	10.995	13.582	16.98	Pass

§ 15.407 Output Power measurement result for 5.5GHz :

Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
			Chain 0	Chain 1	Total		
802.11a	5500	Low	9.718	-	9.718	13.78	Pass
	5580	Mid	10.713	-	10.713	13.78	Pass
	5700	High	10.466	-	10.466	13.78	Pass
802.11n-20	5500	Low	7.223	7.102	10.173	13.78	Pass
	5580	Mid	7.546	7.721	10.645	13.78	Pass
	5700	High	6.749	6.921	9.846	13.78	Pass
802.11n-40	5510	Low	7.522	7.386	10.465	13.78	Pass
	5550	Mid	7.070	7.120	10.105	13.78	Pass
	5670	High	7.362	8.113	10.764	13.78	Pass

Test Plot for W53:

Chain 0:

802.11a-5260M

802.11a-5280M

802.11a-5320M

802.11n20 5260M

802.11n20 5280M

802.11n20 5320M

802.11n40 5270M

802.11n40 5310M

Chain 1:

802.11n20 5260M

802.11n20 5280M

802.11n20 5320M

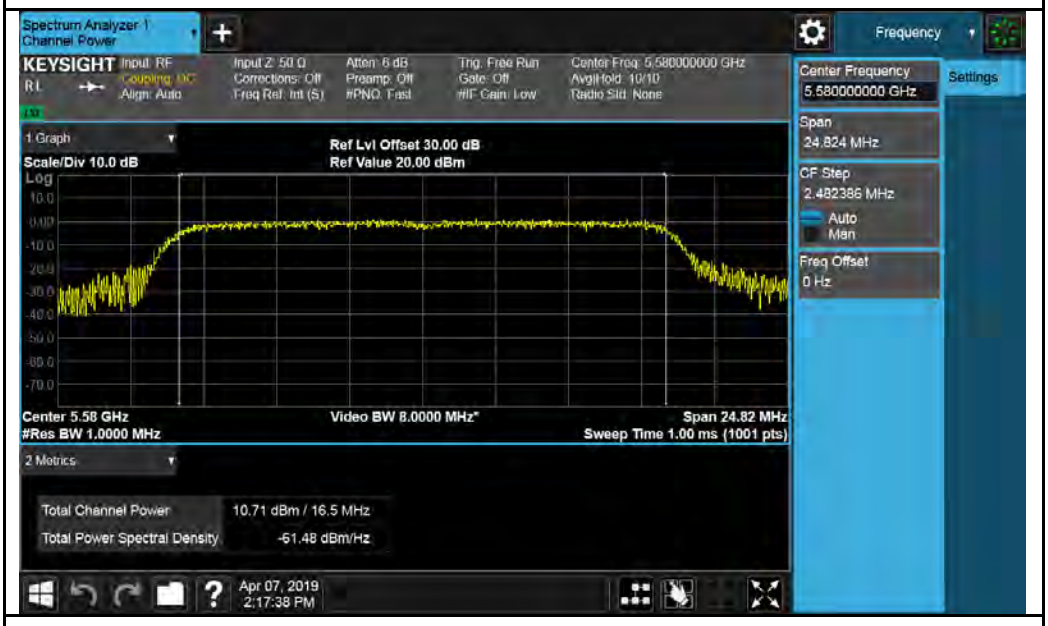
802.11n40 5270M

802.11n40 5310M

Test Plot for W56:

Chain 0:

802.11a-5500M



802.11a-5580M

802.11a-5700M

802.11n20 5500M

802.11n20 5580M

802.11n20 5700M

802.11n40 5510M

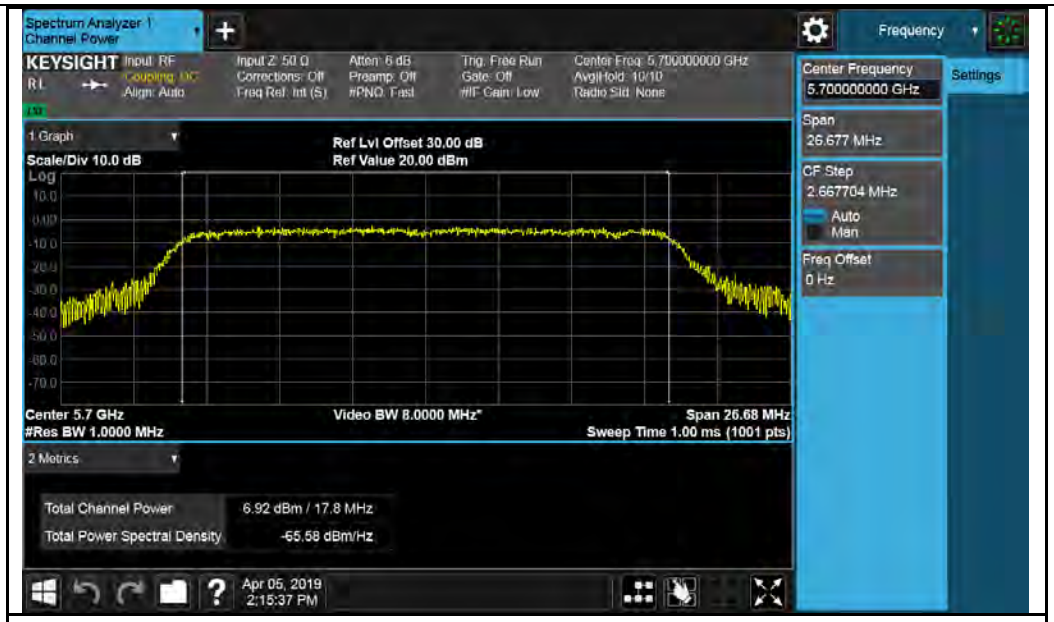
802.11n40 5550M

802.11n40 5670M

Chain 1:

802.11n20-5500M

802.11n20 5580M



802.11n20 5700M

802.11n40 5510M

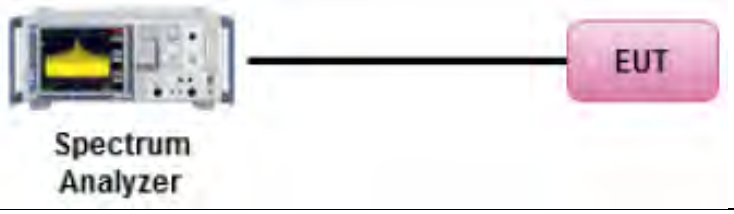
802.11n40 5550M

802.11n40 5670M

10.5 Peak Power 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.	☐
	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.	☐
	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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	☒
	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.	☐

Test Setup	
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 Maximum spectral density measurement procedure - 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. Apply correction to the result if different RBW is used.

Test Date	02/06/2019	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22ºC 46% 1020mbar
Remark	2x2 mode: The EUT has 2 antennas with 1 vertical and 1 horizontal, individual gain = 13dBi(Band 2), 16.2dBi(Band 3).			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by gary Chou at RF test site.

PSD measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined PSD		
PSD	802.11a	5260	Low	0.225	-	0.225	4	Pass
PSD	802.11a	5280	Mid	-1.732	-	-1.732	4	Pass
PSD	802.11a	5320	High	-0.720	-	-0.720	4	Pass
PSD	802.11n-20M	5260	Low	-2.588	-1.534	0.981	4	Pass
PSD	802.11n-20M	5280	Mid	-2.805	-2.178	0.530	4	Pass
PSD	802.11n-20M	5320	High	-1.808	-1.659	1.277	4	Pass
PSD	802.11n-40M	5270	Low	-5.246	-4.389	-1.786	4	Pass
PSD	802.11n-40M	5310	Mid	-4.475	-3.910	-1.173	4	Pass

PSD measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined PSD		
PSD	802.11a	5500	Low	-1.760	-	-1.760	0.8	Pass
PSD	802.11a	5580	Mid	-1.132	-	-1.132	0.8	Pass
PSD	802.11a	5700	High	-1.763	-	-1.763	0.8	Pass
PSD	802.11n-20M	5500	Low	-4.590	-4.785	-1.676	0.8	Pass
PSD	802.11n-20M	5580	Mid	-4.133	-4.049	-1.080	0.8	Pass
PSD	802.11n-20M	5700	High	-5.232	-4.942	-2.074	0.8	Pass
PSD	802.11n-40M	5510	Low	-7.192	-7.529	-4.347	0.8	Pass
PSD	802.11n-40M	5550	Mid	-6.435	-6.577	-3.495	0.8	Pass
PSD	802.11n-40M	5670	High	-7.660	-6.889	-4.247	0.8	Pass

Test Plot for W53:

Chain 0:

802.11a-5260M

802.11a-5280M

802.11a-5320M

802.11n20 5260M

802.11n20 5280M

802.11n20 5320M

802.11n40 5270M

802.11n40 5310M

Chain 1:

802.11n20 5260M

802.11n20 5280M

802.11n20 5320M

802.11n40 5270M

802.11n40 5310M

Test Plot for W56:

Chain 0:

802.11a-5500M

802.11a-5580M

802.11a-5700M

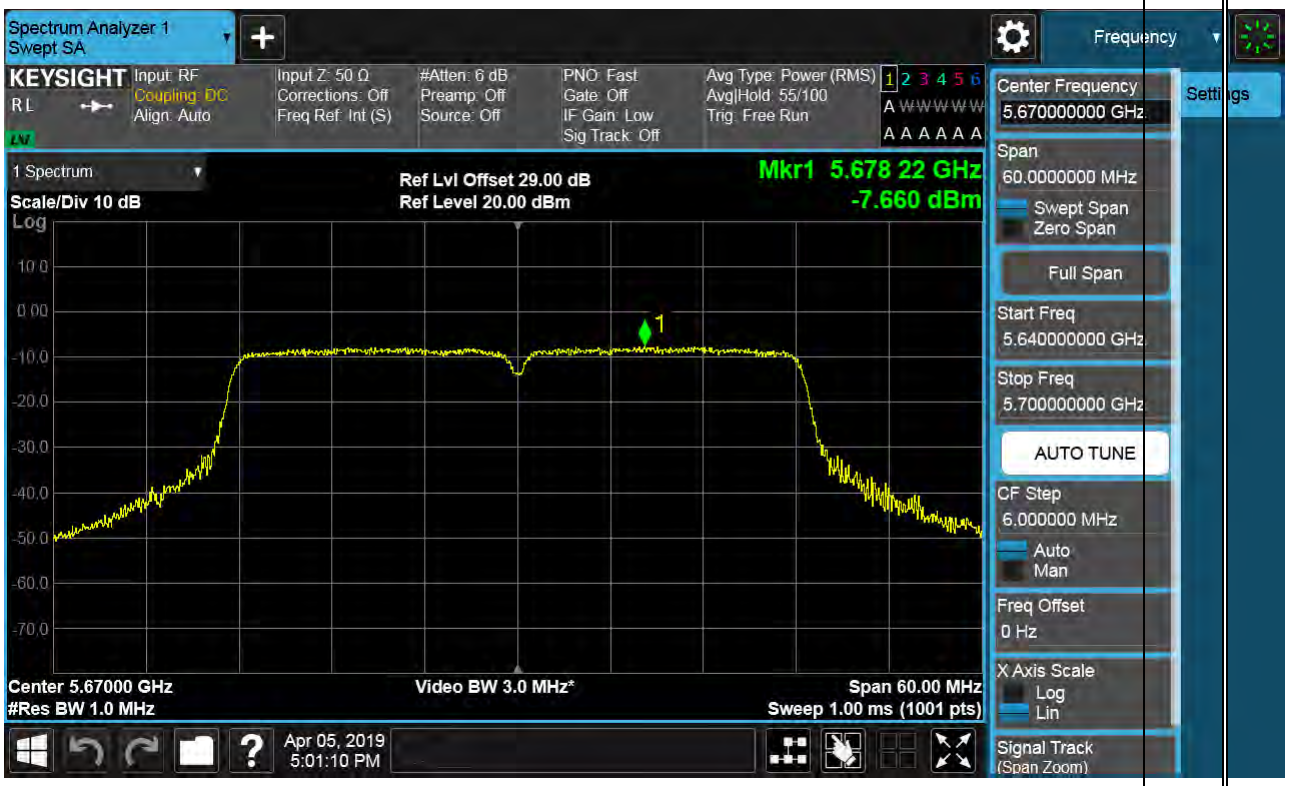
802.11n20 5500M

802.11n20 5580M

802.11n20 5700M

802.11n40 5510M

802.11n40 5550M



802.11n40 5670M

Chain 1:

802.11n20-5500M

802.11n20 5580M

802.11n20 5700M

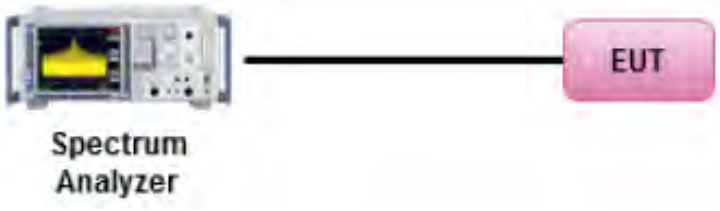
802.11n40 5510M

802.11n40 5550M

802.11n40 5670M

10.6 Band Edge Measurement

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.	☐
	(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.	☒
	(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.	☒
	(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.	☐
Test Setup			
Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 Band Edge measurement: - For average emissions measurements, follow the procedures described in section II.G.6., "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes: - Set RBW=100kHz - Set VBW=300kHz - Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.		
Remark	Directional gain was added to the offset.		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

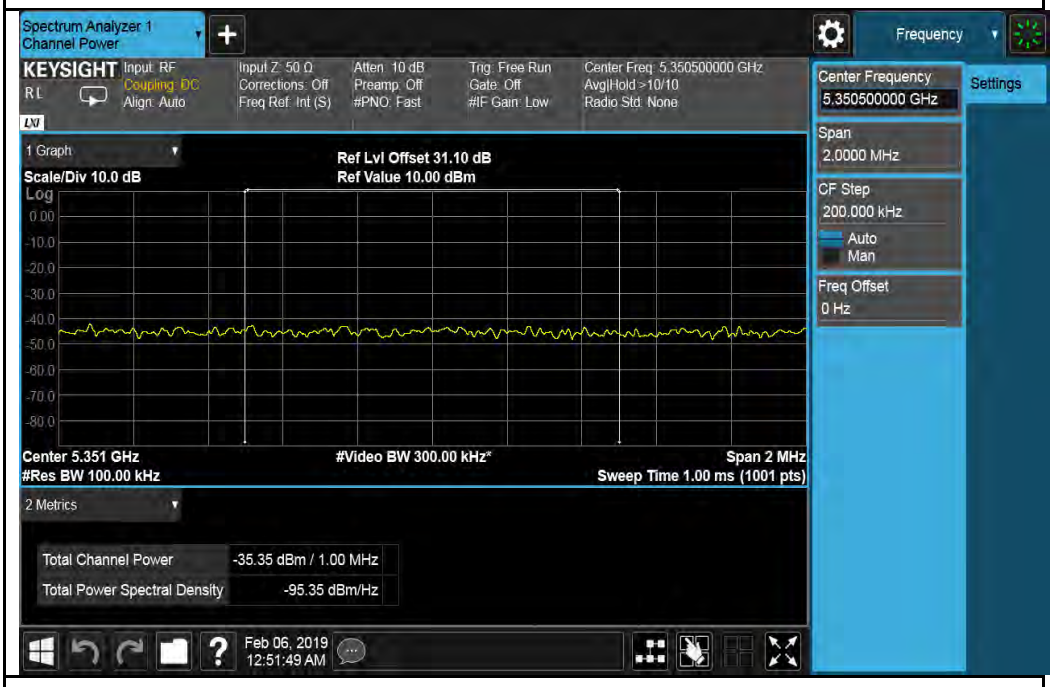
Test was done by Rachana Khanduri at RF test site.

Test Plots for W53:
Chain 0:

802.11a-5260MHz

802.11a-5320MHz

802.11n-HT20-5260MHz

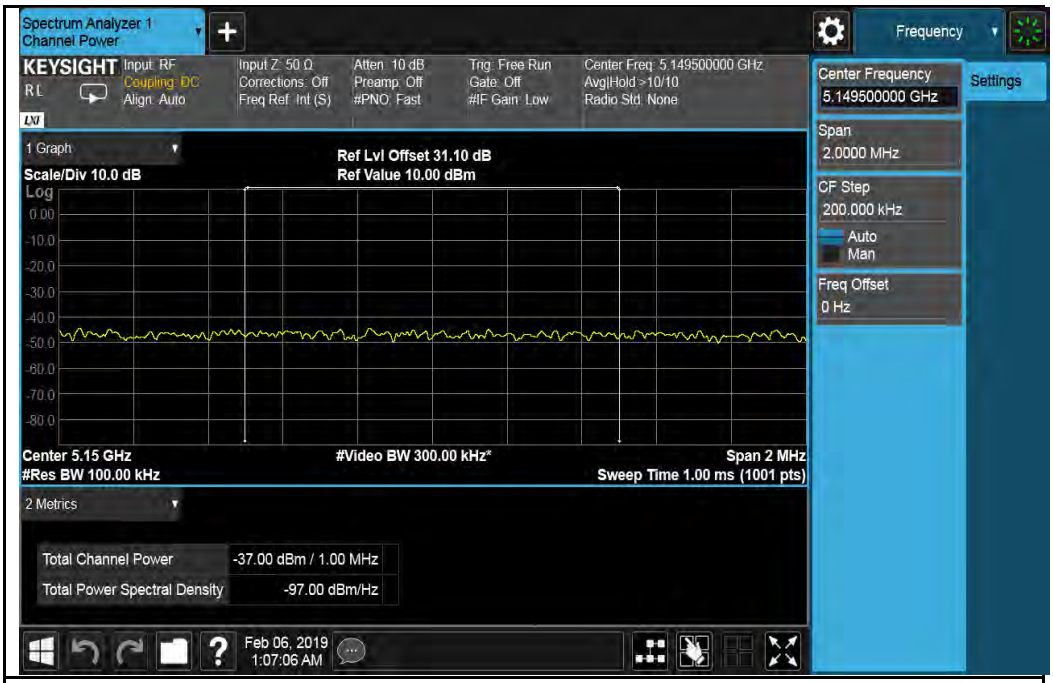


802.11n-HT20-5320MHz

802.11n-HT40-5270MHz

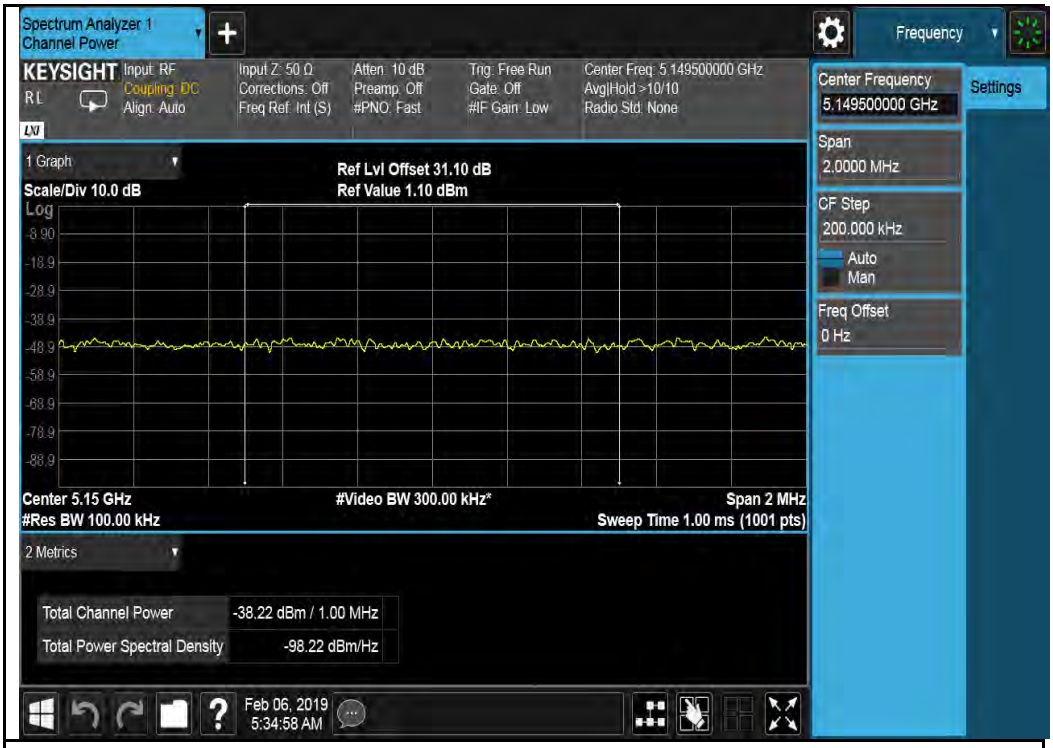
802.11n-HT40-5310MHz

Chain 1:

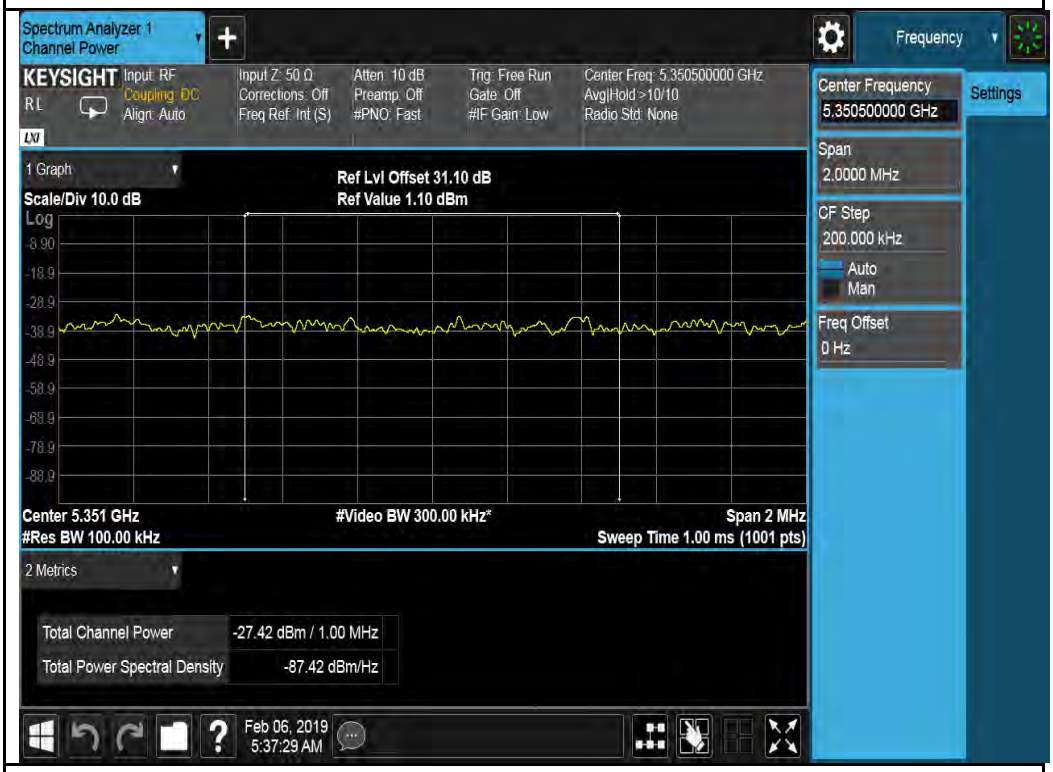


802.11n-HT20-5260MHz

802.11n-HT20-5320MHz

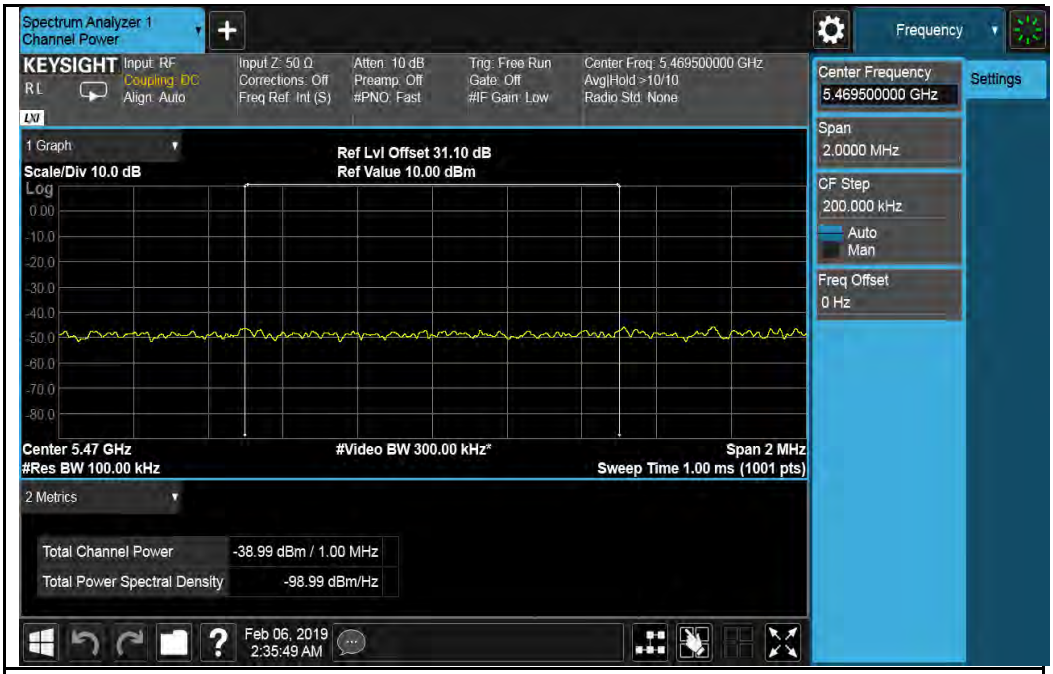


d802.11n-HT40-5270MHz

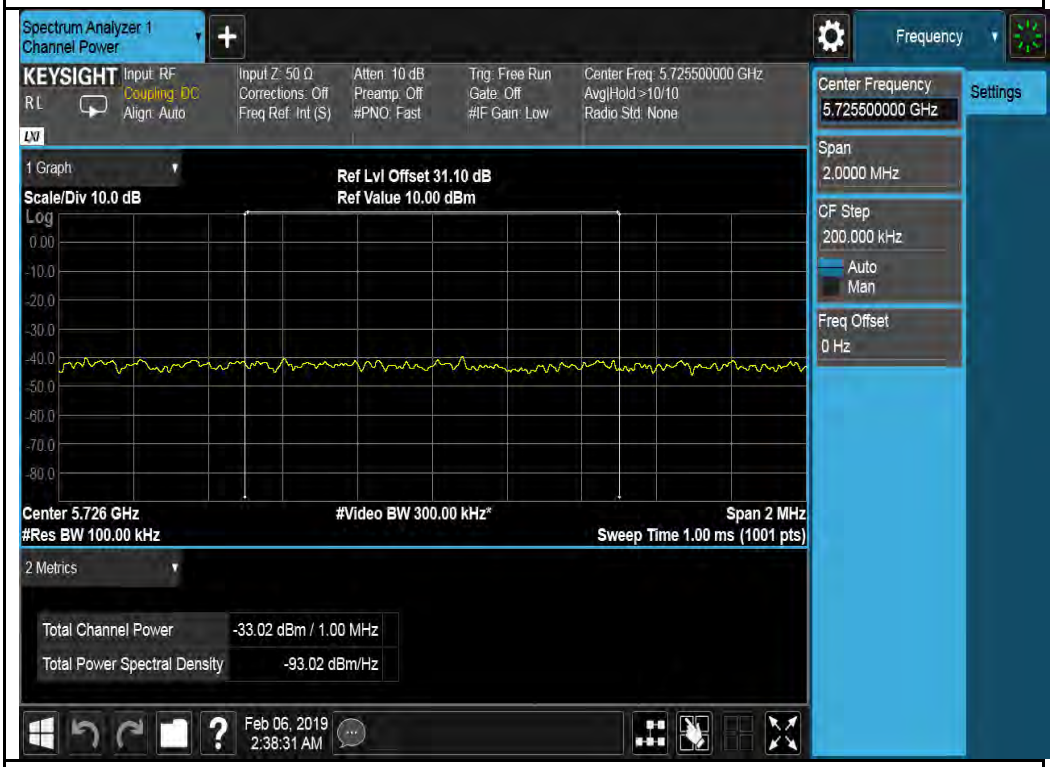


802.11n-HT40-5310MHz

Test Plots for W56 :
Chain 0:



802.11a-5500MHz

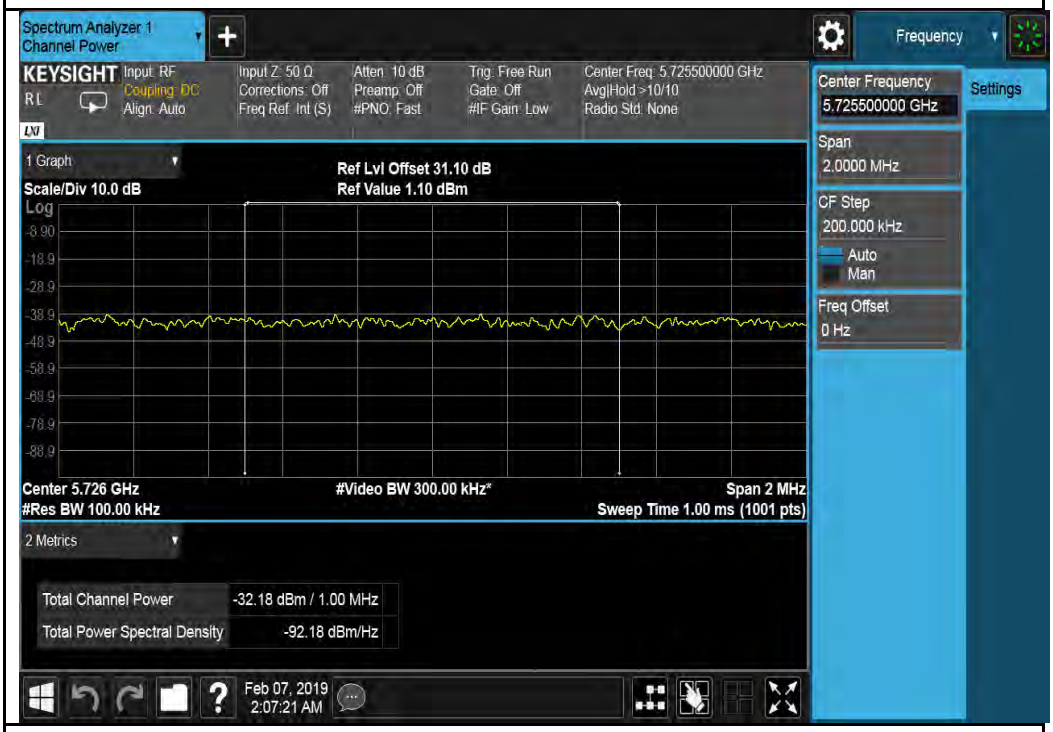


802.11a-5700MHz

802.11n-HT20-5500MHz

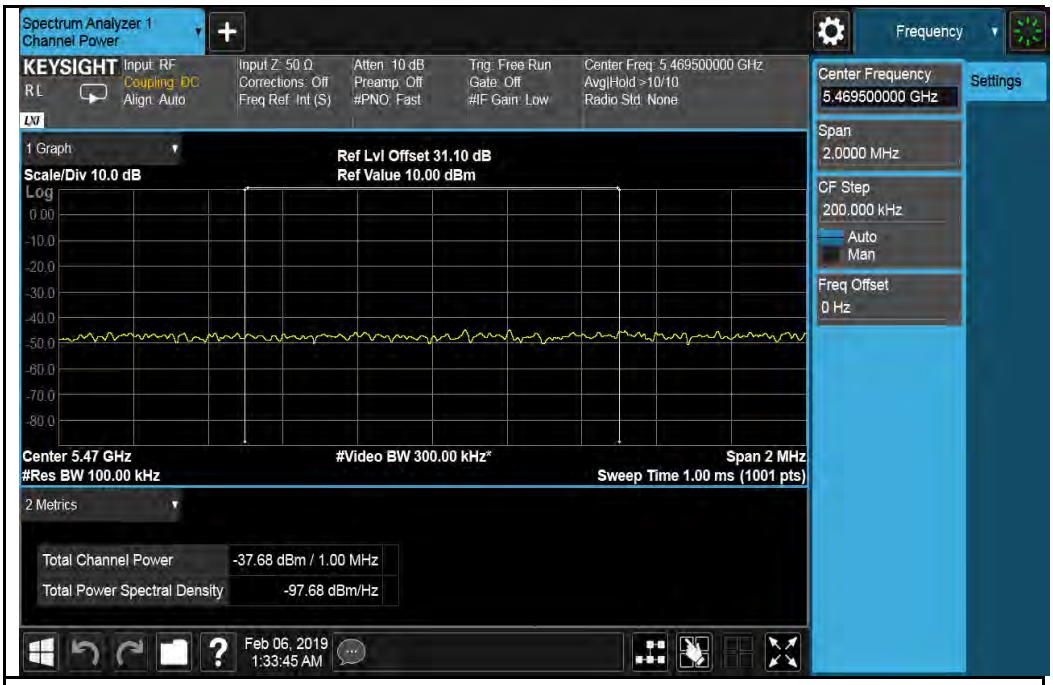
802.11n-HT20-5700MHz

802.11n-HT40-5510MHz

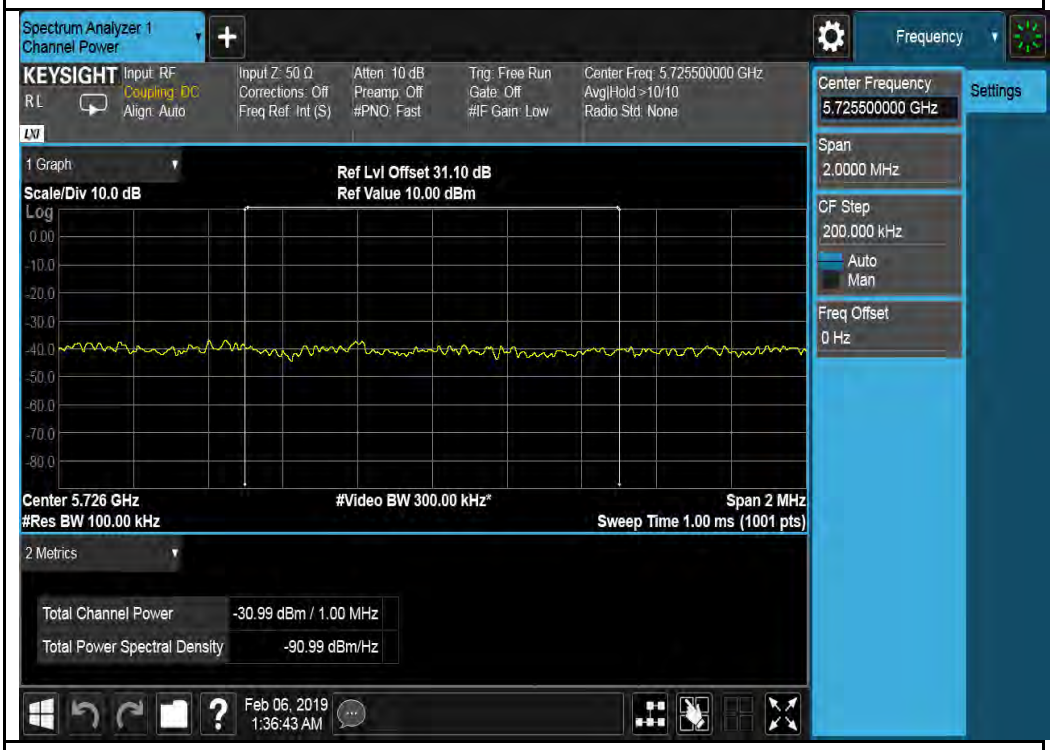


802.11n-HT40-5670MHz

Chain 1:

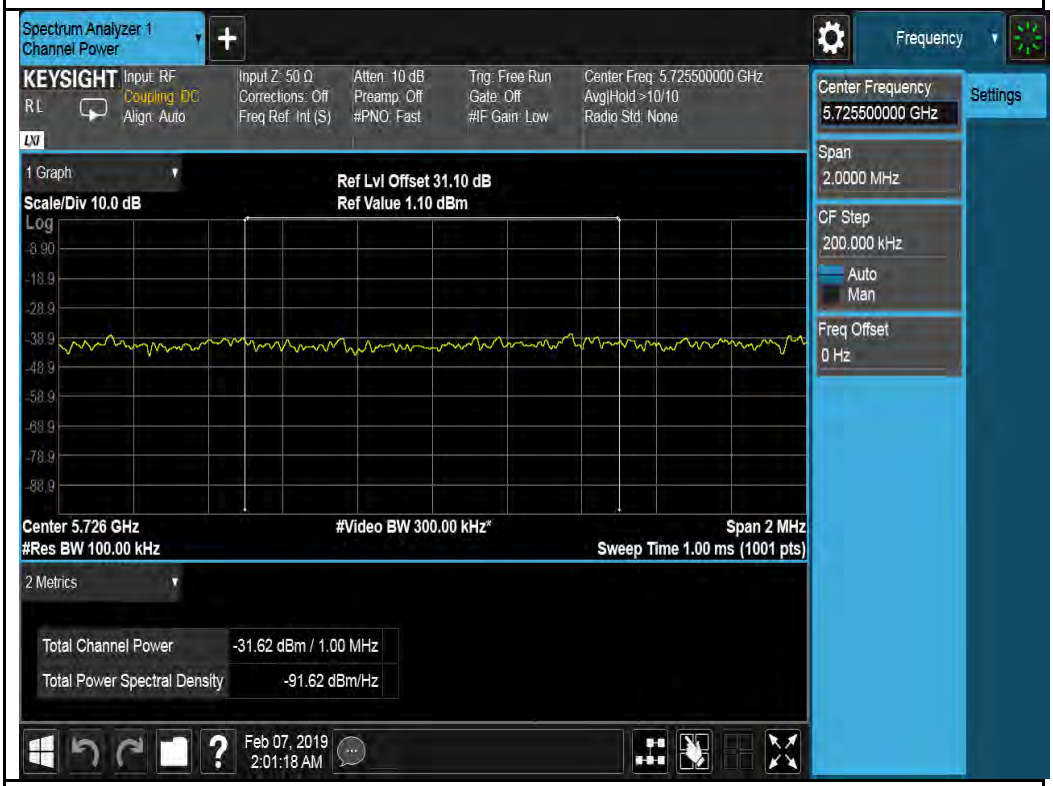


802.11n-HT20-5500MHz



802.11n-HT20-5700MHz

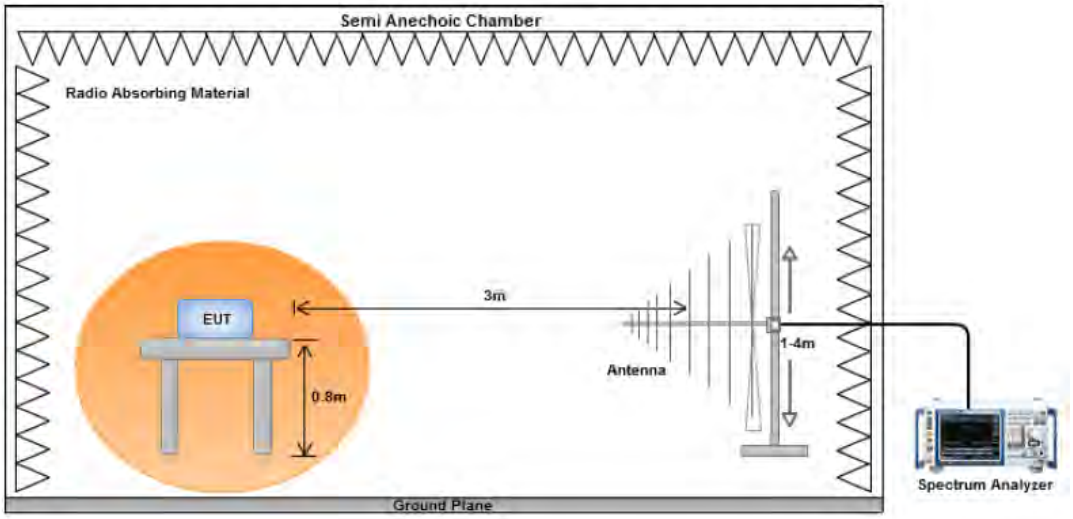
802.11n-HT40-5510MHz



802.11n-HT40-5670MHz

10.7 Radiated Spurious Emissions below 1GHz

Requirement(s):

<table>
<tr><th>Spec</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§ 15.407(b) 15.209 (a)</td><td>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr>
<tr><td>30 – 88</td><td>100</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 960</td><td>200</td></tr>
<tr><td>Above 960</td><td>500</td></tr>
</table></td><td>☒</td></tr>
<tr><td>Test Setup</td><td> 
</td><td></td></tr>
<tr><td>Procedure</td><td>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.</td><td></td></tr>
<tr><td>Remark</td><td>The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.</td><td></td></tr>
<tr><td>Result</td><td>☒ Pass ☐ Fail</td><td></td></tr>
</table>

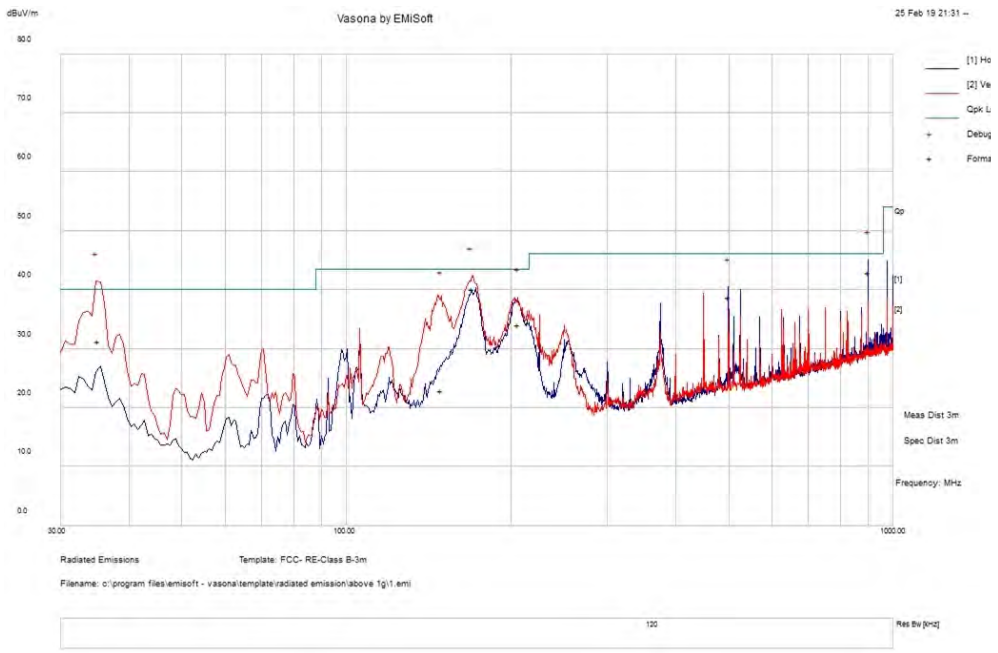
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26.1	Result	Pass
	Humidity (%)	47.5		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Gary Chou			
Test Date:	02/25/2019			
Remarks:	802.11n40, 5550MHz			

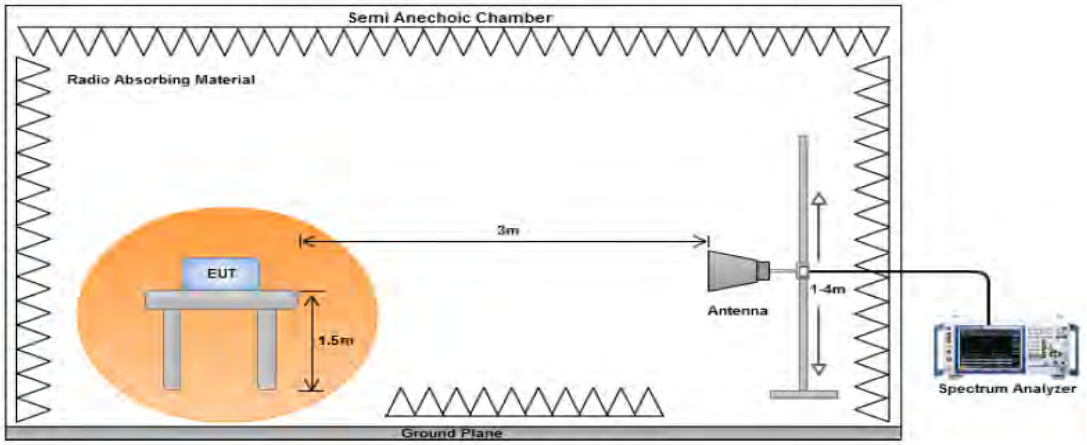


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
35.068	36.66	11.2	-16.6	31.25	Quasi Max	V	228	174	40	-8.75	Pass
900.02	40.25	15.95	-13.28	42.92	Quasi Max	H	105	195	46	-3.08	Pass
169.65	51.64	12.35	-23.83	40.16	Quasi Max	V	210	19	43.5	-3.34	Pass
206.02	45.99	12.68	-24.57	34.09	Quasi Max	H	177	77	43.5	-9.41	Pass
148.71	34.04	12.21	-23.37	22.88	Quasi Max	H	102	261	43.5	-20.62	Pass
500.02	42.81	14.17	-18.27	38.7	Quasi Max	H	113	77	46	-7.3	Pass

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

10.8 Radiated Spurious Emissions 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.	☐
	(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.	☒
	(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.	☒
	(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.	☐
	(5)	Restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. An average measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. 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

Test was done by Gary Chou at 10m chamber.

Radiated Restricted band and Band Edge Measurement Plots:

802.11a 5320M(5350-5460MHz)

802.11n20 5320M(5350-5460MHz)

802.11n40 5310M(5350-5460MHz)

	
802.11a 5500M(5350-5460MHz)	802.11n20 5500M(5350-5460MHz)
	
802.11n40 5510M(5350-5460MHz)	

Radiated Emission Test Results (Above 1GHz)

W53 band:

Above 1GHz-40GHz – 802.11a – 5260MHz

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
7280.33	51.83	5.16	-7.69	49.3	Peak Max	H	264	296	74	-24.7	Pass
10520.21	55.01	6.09	-3.78	57.32	Peak Max	V	229	44	74	-16.68	Pass
13857.57	46.44	7.19	-1.66	51.97	Peak Max	H	167	159	74	-22.03	Pass
7280.33	38.81	5.16	-7.69	36.28	Average Max	H	264	296	54	-17.72	Pass
10520.21	41.43	6.09	-3.78	43.74	Average Max	V	229	44	54	-10.26	Pass
13857.57	32.5	7.19	-1.66	38.03	Average Max	H	167	159	54	-15.97	Pass

Above 1GHz-40GHz – 802.11a – 5280MHz

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
7038.34	50.95	5.09	-7.79	48.25	Peak Max	H	266	295	74	-25.75	Pass
10559.63	54.89	6.1	-3.71	57.28	Peak Max	V	231	42	74	-16.72	Pass
13804.14	46.28	7.16	-1.71	51.73	Peak Max	H	161	154	74	-22.27	Pass
7038.34	37.82	5.09	-7.79	35.12	Average Max	H	266	295	54	-18.88	Pass
10559.63	41.45	6.1	-3.71	43.84	Average Max	V	231	42	54	-10.16	Pass
13804.14	32.53	7.16	-1.71	37.98	Average Max	H	161	154	54	-16.02	Pass

Above 1GHz-40GHz – 802.11a – 5320MHz

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
7963.64	52.03	5.4	-7.06	50.37	Peak Max	V	273	301	74	-23.63	Pass
10640.47	55.22	6.14	-3.61	57.75	Peak Max	V	234	42	74	-16.25	Pass
13923.95	48.02	7.24	-1.61	53.65	Peak Max	H	166	154	74	-20.35	Pass
7963.64	38.73	5.4	-7.06	37.07	Average Max	V	273	301	54	-16.93	Pass
10640.47	42.06	6.14	-3.61	44.59	Average Max	V	234	42	54	-9.41	Pass
13923.95	34.44	7.24	-1.61	40.07	Average Max	H	166	154	54	-13.93	Pass

Above 1GHz-40GHz – 802.11n-20M – 5260MHz

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
7905.52	41.05	5.35	-0.33	46.07	Peak Max	H	266	300	74	-27.93	Pass
10520.91	44.96	6.09	1.89	52.94	Peak Max	H	232	47	74	-21.06	Pass
13721.76	45.84	7.11	4.58	57.53	Peak Max	V	169	160	74	-16.47	Pass
7905.52	23.1	5.35	-0.33	28.12	Average Max	V	266	300	54	-25.88	Pass
10520.91	27.16	6.09	1.89	35.14	Average Max	V	232	47	54	-18.86	Pass
13721.76	28.43	7.11	4.58	40.12	Average Max	V	169	160	54	-13.88	Pass

Above 1GHz-40GHz – 802.11n-20M – 5280MHz

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
7550.49	41.84	5.15	-0.41	46.58	Peak Max	V	266	303	74	-27.42	Pass
10559.19	44.89	6.1	1.91	52.9	Peak Max	H	232	42	74	-21.1	Pass
13459.06	46.39	7.04	4.52	57.95	Peak Max	H	168	161	74	-16.05	Pass
7550.49	24.77	5.15	-0.41	29.51	Average Max	H	266	303	54	-24.49	Pass
10559.19	27.14	6.1	1.91	35.15	Average Max	V	232	42	54	-18.85	Pass
13459.06	29.29	7.04	4.52	40.85	Average Max	H	168	161	54	-13.15	Pass

Above 1GHz-40GHz – 802.11n-20M – 5320MHz

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
7431.77	41.83	5.14	-0.39	46.58	Peak Max	H	264	299	74	-27.42	Pass
10640.42	45.22	6.14	1.92	53.28	Peak Max	V	230	49	74	-20.72	Pass
13230.10	46.09	6.99	4.48	57.56	Peak Max	V	161	156	74	-16.44	Pass
7431.77	23.87	5.14	-0.39	28.62	Average Max	H	264	299	54	-25.38	Pass
10640.42	27.65	6.14	1.92	35.71	Average Max	H	230	49	54	-18.29	Pass
13230.10	28.2	6.99	4.48	39.67	Average Max	V	161	156	54	-14.33	Pass

Above 1GHz-40GHz – 802.11n-40M – 5270MHz

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
7223.03	42.15	5.15	-0.32	46.98	Peak Max	V	265	298	74	-27.02	Pass
10540.86	44.96	6.09	1.89	52.94	Peak Max	V	234	44	74	-21.06	Pass
13598.37	47.12	7.08	4.6	58.8	Peak Max	H	169	157	74	-15.2	Pass
7223.03	24.8	5.15	-0.32	29.63	Average Max	H	265	298	54	-24.37	Pass
10520.86	27.06	6.09	1.89	35.04	Average Max	H	234	44	54	-18.96	Pass
13598.37	29.5	7.08	4.6	41.18	Average Max	H	169	157	54	-12.82	Pass

Above 1GHz-40GHz – 802.11n-40M – 5310MHz

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
7825.58	41.57	5.28	-0.32	46.53	Peak Max	V	271	296	74	-27.47	Pass
10620.84	44.88	6.1	1.91	52.89	Peak Max	V	225	44	74	-21.11	Pass
13397.52	46.29	7.03	4.57	57.89	Peak Max	V	161	157	74	-16.11	Pass
7825.58	24.22	5.28	-0.32	29.18	Average Max	H	271	296	54	-24.82	Pass
10559.84	27.04	6.1	1.91	35.05	Average Max	H	225	44	54	-18.95	Pass
13397.52	28.38	7.03	4.57	39.98	Average Max	H	161	157	54	-14.02	Pass

W56 band:
Above 1GHz-40GHz – 802.11a – 5500MHz

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
7726.46	41.39	5.21	-0.32	46.28	Peak Max	H	273	296	74	-27.72	Pass
11000.35	44.42	6.13	1.95	52.5	Peak Max	H	232	41	74	-21.5	Pass
13546.24	47.46	7.06	4.54	59.06	Peak Max	H	167	162	74	-14.94	Pass
7726.18	23.33	5.21	-0.32	28.22	Average Max	V	273	296	54	-25.78	Pass
11000.64	27.46	6.13	1.95	35.54	Average Max	H	232	41	54	-18.46	Pass
13546.53	30.19	7.06	4.54	41.79	Average Max	H	167	162	54	-12.21	Pass

Above 1GHz-40GHz – 802.11a – 5580MHz

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
7126.46	41.27	5.12	-0.29	46.1	Peak Max	V	271	298	74	-27.9	Pass
11159.37	44.39	6.07	2.14	52.6	Peak Max	V	229	47	74	-21.4	Pass
13029.52	47.46	6.91	4.55	58.92	Peak Max	H	161	154	74	-15.08	Pass
7126.19	24.19	5.12	-0.29	29.02	Average Max	V	271	298	54	-24.98	Pass
11159.34	27.27	6.07	2.14	35.48	Average Max	V	229	47	54	-18.52	Pass
13029.19	29.37	6.91	4.55	40.83	Average Max	H	161	154	54	-13.17	Pass

Above 1GHz-40GHz – 802.11a – 5700MHz

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
7780.45	42.57	5.25	-0.32	47.5	Peak Max	H	270	304	74	-26.5	Pass
11400.24	44.39	6.05	2.53	52.97	Peak Max	H	229	45	74	-21.03	Pass
13611.18	46.25	7.08	4.6	57.93	Peak Max	V	161	160	74	-16.07	Pass
7780.67	24.44	5.25	-0.32	29.37	Average Max	V	270	304	54	-24.63	Pass
11400.29	27.37	6.05	2.53	35.95	Average Max	H	229	45	54	-18.05	Pass
13611.43	29.51	7.08	4.6	41.19	Average Max	V	161	160	54	-12.81	Pass

Above 1GHz-40GHz – 802.11n-20M – 5500MHz

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
7726.08	41.36	5.21	-0.32	46.25	Peak Max	H	273	296	74	-27.75	Pass
11000.95	44.32	6.13	1.95	52.4	Peak Max	H	232	41	74	-21.6	Pass
13546.73	47.73	7.06	4.54	59.33	Peak Max	H	167	162	74	-14.67	Pass
7726.08	23.4	5.21	-0.32	28.29	Average Max	V	273	296	54	-25.71	Pass
11000.95	27.2	6.13	1.95	35.28	Average Max	H	232	41	54	-18.72	Pass
13546.73	30.71	7.06	4.54	42.31	Average Max	H	167	162	54	-11.69	Pass

Above 1GHz-40GHz – 802.11n-20M – 5580MHz

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
7126.88	41.85	5.12	-0.29	46.68	Peak Max	V	271	298	74	-27.32	Pass
11159.17	44.91	6.07	2.14	53.12	Peak Max	V	229	47	74	-20.88	Pass
13029.50	47.08	6.91	4.55	58.54	Peak Max	H	161	154	74	-15.46	Pass
7126.88	24.45	5.12	-0.29	29.28	Average Max	V	271	298	54	-24.72	Pass
11159.17	27.47	6.07	2.14	35.68	Average Max	V	229	47	54	-18.32	Pass
13029.50	29.56	6.91	4.55	41.02	Average Max	H	161	154	54	-12.98	Pass

Above 1GHz-40GHz – 802.11n-20M – 5700MHz

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
7780.66	42.64	5.25	-0.32	47.57	Peak Max	H	270	304	74	-26.43	Pass
11400.64	44.75	6.05	2.53	53.33	Peak Max	H	229	45	74	-20.67	Pass
13611.36	46.65	7.08	4.6	58.33	Peak Max	V	161	160	74	-15.67	Pass
7780.66	24.86	5.25	-0.32	29.79	Average Max	V	270	304	54	-24.21	Pass
11400.64	27.08	6.05	2.53	35.66	Average Max	H	229	45	54	-18.34	Pass
13611.36	29.5	7.08	4.6	41.18	Average Max	V	161	160	54	-12.82	Pass

Above 1GHz-40GHz – 802.11n-40M – 5510MHz

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
7056.91	41.32	5.1	-0.27	46.15	Peak Max	H	269	303	74	-27.85	Pass
11019.18	45.21	6.12	1.97	53.3	Peak Max	V	234	46	74	-20.7	Pass
13218.27	46.96	6.99	4.46	58.41	Peak Max	V	168	161	74	-15.59	Pass
7056.91	23.74	5.1	-0.27	28.57	Average Max	V	269	303	54	-25.43	Pass
11019.18	27.39	6.12	1.97	35.48	Average Max	V	234	46	54	-18.52	Pass
13218.27	28.98	6.99	4.46	40.43	Average Max	H	168	161	54	-13.57	Pass

Above 1GHz-40GHz – 802.11n-40M – 5550MHz

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
7672.06	41.85	5.19	-0.32	46.72	Peak Max	V	267	302	74	-27.28	Pass
11100.09	44.63	6.09	2.07	52.79	Peak Max	V	227	45	74	-21.21	Pass
13102.76	46.14	6.94	4.43	57.51	Peak Max	V	163	162	74	-16.49	Pass
7672.06	24.26	5.19	-0.32	29.13	Average Max	H	267	302	54	-24.87	Pass
11100.09	27.62	6.09	2.07	35.78	Average Max	H	227	45	54	-18.22	Pass
13102.76	28.86	6.94	4.43	40.23	Average Max	V	163	162	54	-13.77	Pass

Above 1GHz-40GHz – 802.11n-40M – 5670MHz

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
7912.03	41.7	5.36	-0.33	46.73	Peak Max	H	269	301	74	-27.27	Pass
11340.80	44.56	6.04	2.4	53	Peak Max	V	232	44	74	-21	Pass
13029.42	47.08	6.91	4.55	58.54	Peak Max	V	161	154	74	-15.46	Pass
7912.03	23.9	5.36	-0.33	28.93	Average Max	V	269	301	54	-25.07	Pass
11340.80	26.74	6.04	2.4	35.18	Average Max	V	232	44	54	-18.82	Pass
13029.42	29.2	6.91	4.55	40.66	Average Max	H	161	154	54	-13.34	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
EMI Test Receiver	ESIB 40	100179	08/28/2018	1 Year	8/28/2019	☑
Transient Limiter (9kHz - 100MHz)	EM-7600-5	106	5/26/2018	1 Year	5/26/2019	☑
LISN (9kHz - 30MHz)	3816/2NM	214372	9/27/2018	1 Year	9/27/2019	☑
Radiated Emissions						
50GHz Spectrum Analyzer	N9030B (PXA)	MY57140374	01/25/2019	1 Year	01/25/2020	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	03/09/2018	2 Year	03/09/2020	☑
Horn Antenna (1-18GHz)	3115	10SL0059	01/26/2018	2 Year	01/26/2020	☑
RF Pre-Amplifier (9kHz - 6.5GHz)	LPA-6-30	11170601	07/23/2018	1 Year	07/23/2019	☑
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/06/2018	1 Year	05/06/2019	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY50210206	01/18/2018	2 Year	01/18/2020	☑
MXG Signal Generator	N5182A	MY47071065	08/10/2018	1 Year	08/10/2019	☑

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		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