RF TEST REPORT

Report No.: RF_FCC_SL17021001-SHU-002A1_UNII(DFS) Rev 2.0
Supersede Report No.: RF_FCC_SL17021001-SHU-002A1_UNII(DFS) Rev 1.0

Applicant	:	Shure Inc.
Product Name	:	MXCW Wireless Discussion System
Model No.	:	MXCW640
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01r02
FCC ID	:	DD4MXCW640
IC ID	:	616A-MXCW640
Dates of test	:	09/11/2017 to 09/22/2017
Issue Date	:	10/12/2017
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

Laboratory Introduction

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

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

Accreditations for Conformity Assessment

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

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
RF_FCC_SL17021001-SHU-002_UNII(DFS)	None	Original	09/22/2017
RF_FCC_SL17021001-SHU-002A1_UNII(DFS) Rev 1.0	Rev 1.0	Updated per customer	10/05/2017
RF_FCC_SL17021001-SHU-002A1_UNII(DFS) Rev 2.0	Rev 2.0	Updated per TCB reviewer	10/12/2017

2 Executive Summary

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

Company: Shure Inc.
Product: MXCW Wireless Discussion System
Model: MXCW640

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	:	Shure Inc.
Applicant Address	:	5800 Touhy Ave, Niles, IL 60714 USA
Manufacturer Name	:	Shure Inc.
Manufacturer Address	:	5800 Touhy Ave, Niles, IL 60714 USA

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	MXCW Wireless Discussion System
Model No.	MXCW640
Trade Name	SHURE
Serial No.	N/A
Host Model No.	MXCW640
Input Power	3.6VDC
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	09/11/2017
Equipment Class/ Category	Wideband transmission system
Port/Connectors	3x 3.5mm jacks, micro USB connector, microphone connector

6.2 Radio Description

Radio Type	802.11a
Operating Frequency	5260-5320MHz 5500-5720MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz
Number of Channels	16
Antenna Type	Custom dual band antenna soldered to PCB
Antenna Gain (Peak)	5GHz: 6dBi
Antenna Connector Type	U.FL
Note	2.4GHz and 5GHz Radio do not transmit simultaneously

EUT Power level setting

Mode	Frequency	Power Setting
802.11-a	5260	20
802.11-a	5300	20
802.11-a	5320	20
802.11-a	5500	20
802.11-a	5600	20
802.11-a	5700	20

6.3 EUT Photos-External

EUT – Top View

EUT – Bottom View

EUT – Front View

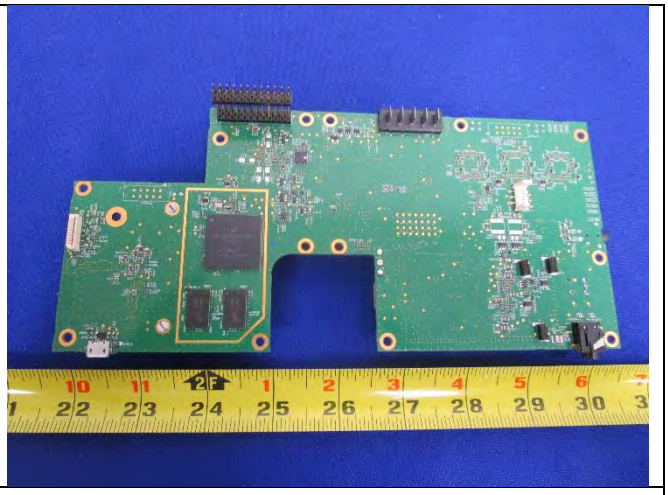
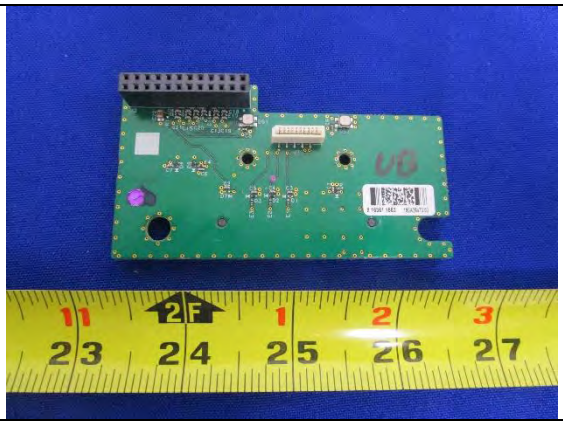
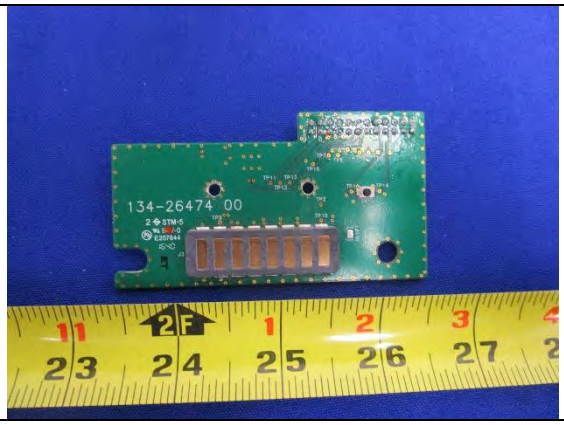
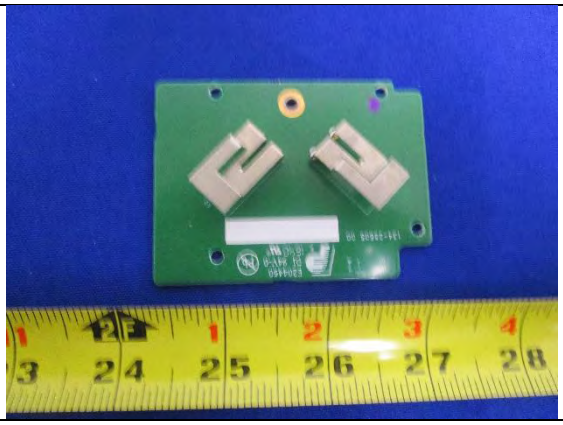
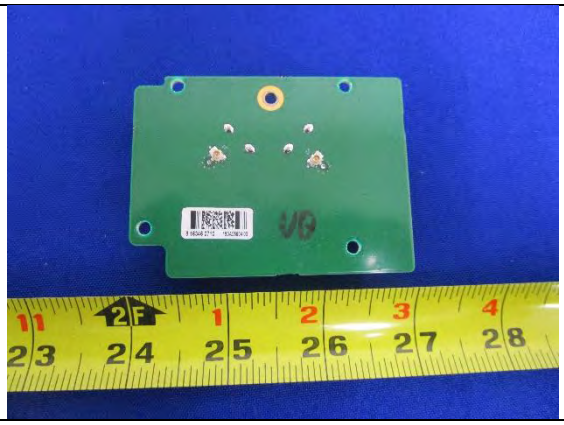
EUT – Rear View

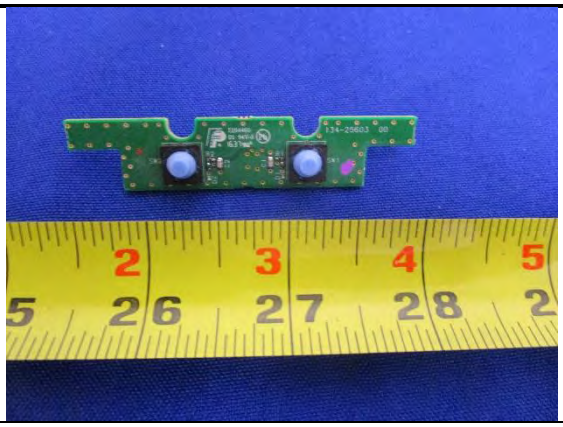
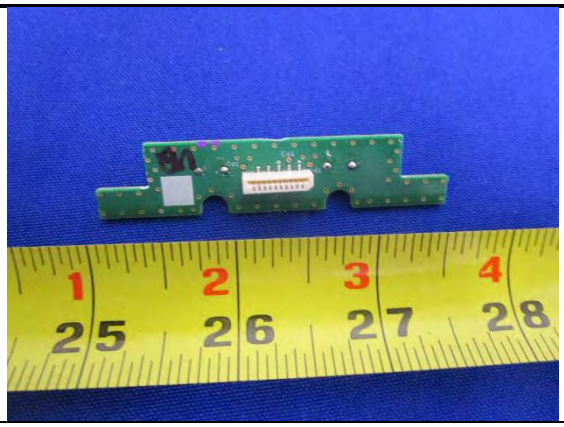
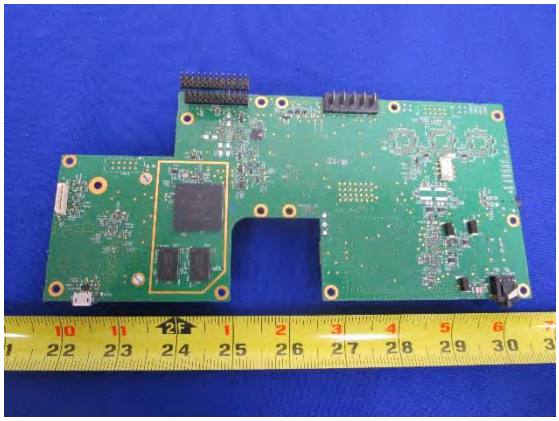
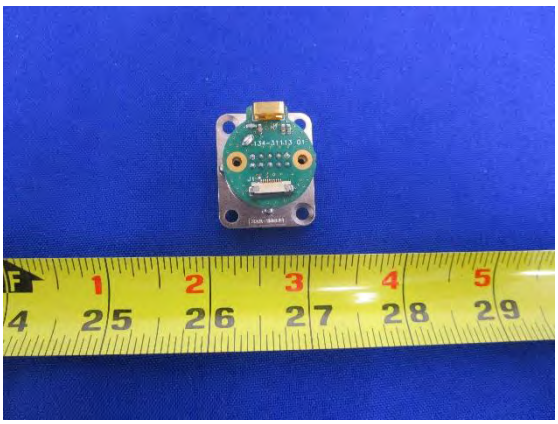
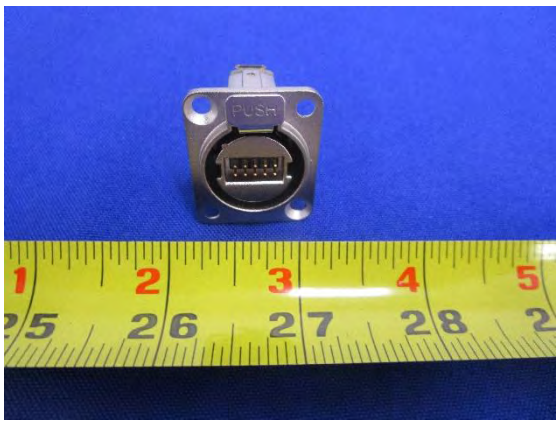
EUT – Left side View

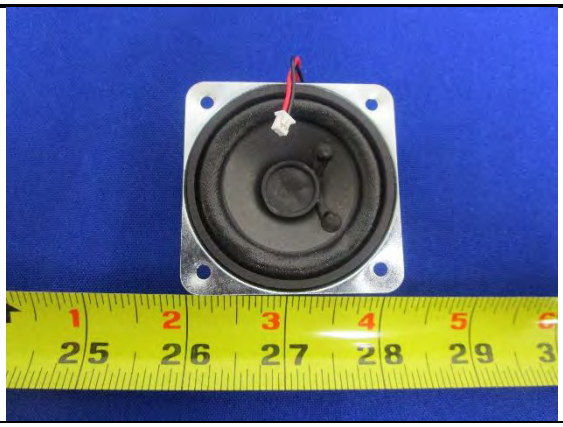
EUT – Right side View

	
EUT – Microphone	

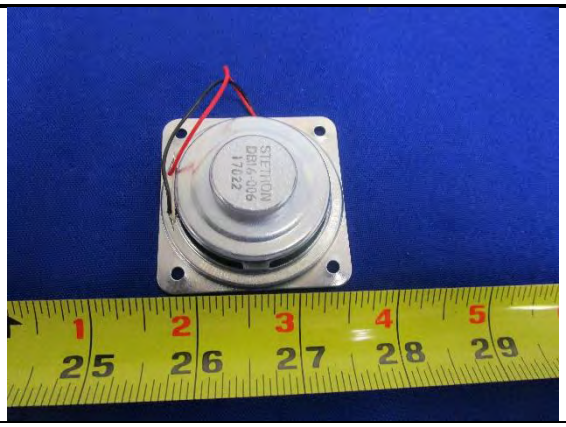
6.4 EUT Photos - Internal

	
Main Board Top View	Main Board Bottom View
	
PCB 1- Front View	PCB 1 – Rear View
	
PCB 2- Front View	PCB 2 – Rear View

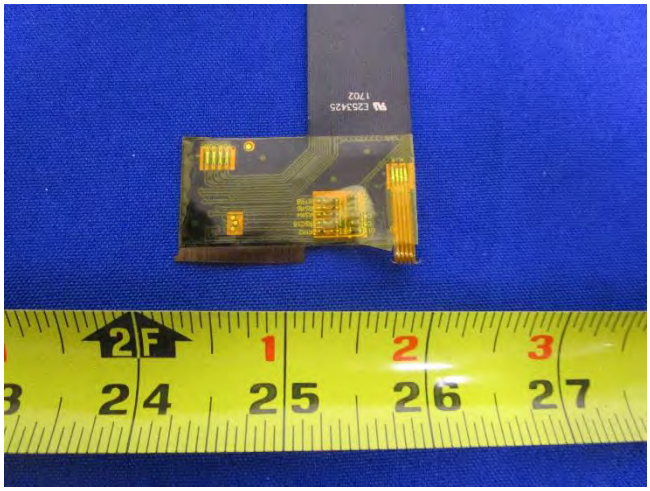
	
PCB 3– Front View	PCB 3 – Rear View
	
PCB 4 – Front View	PCB 4 – Rear View
	
PCB 5 – Front View	PCB 5 – Rear View



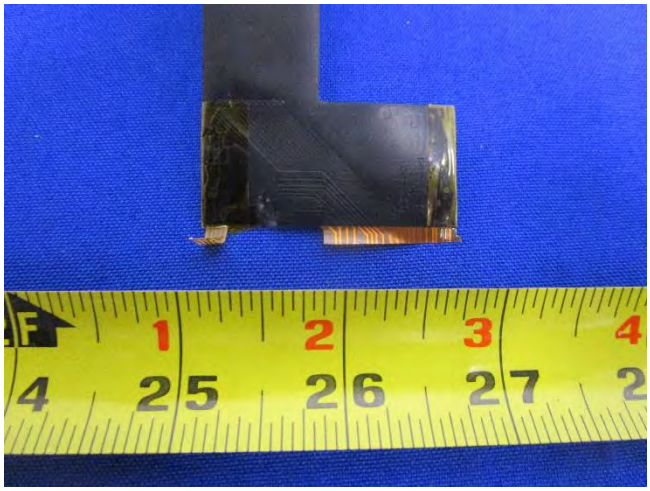
PCB 6 – Front View



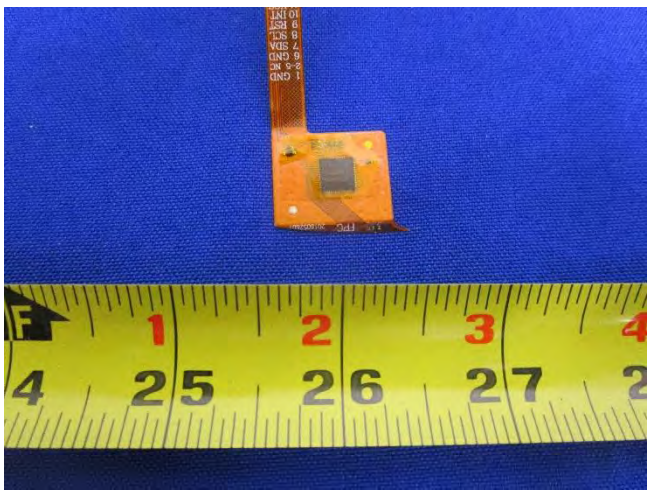
PCB 6 – Rear View



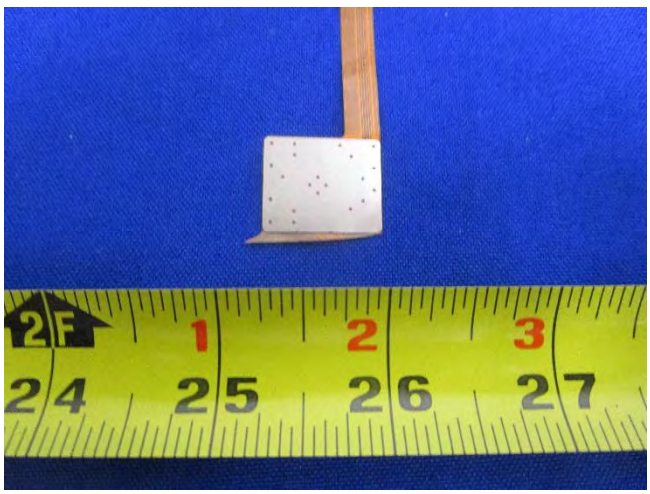
PCB 7 – Rear View



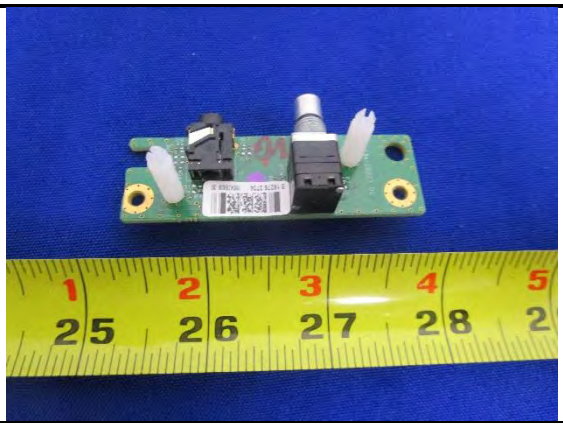
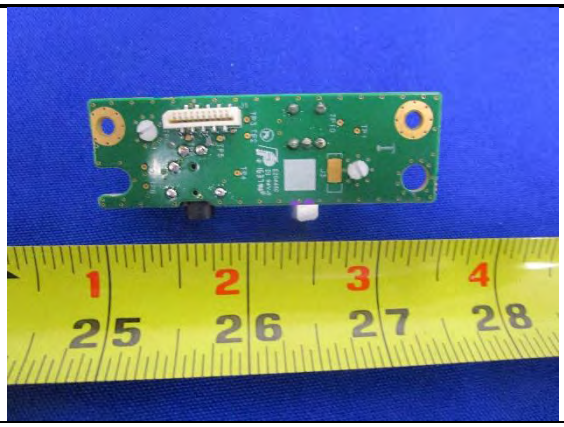
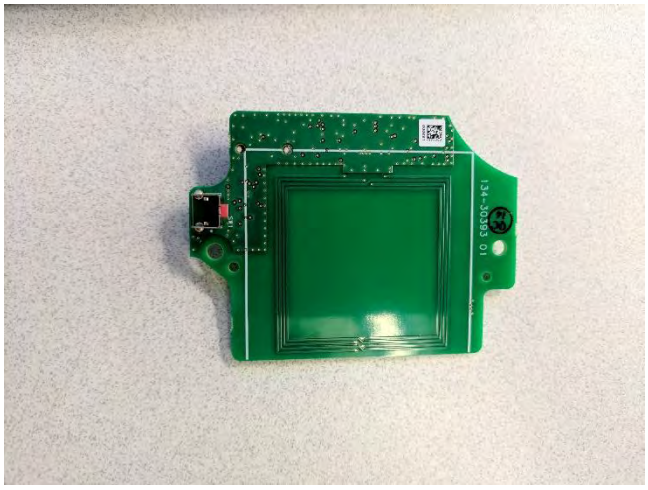
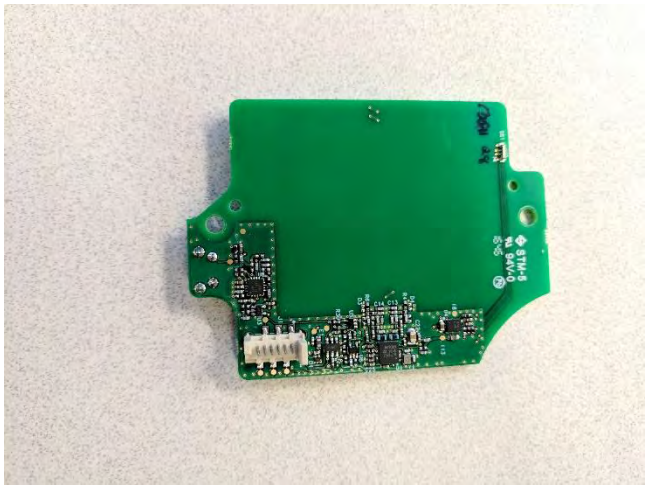
PCB 7 – Rear View



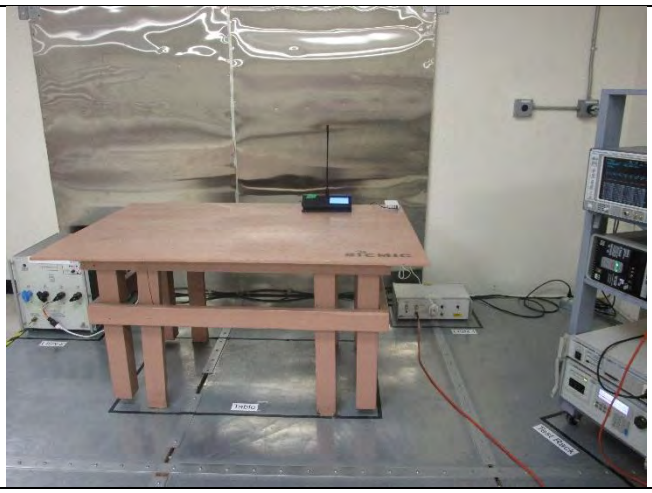
PCB 8 – Front View



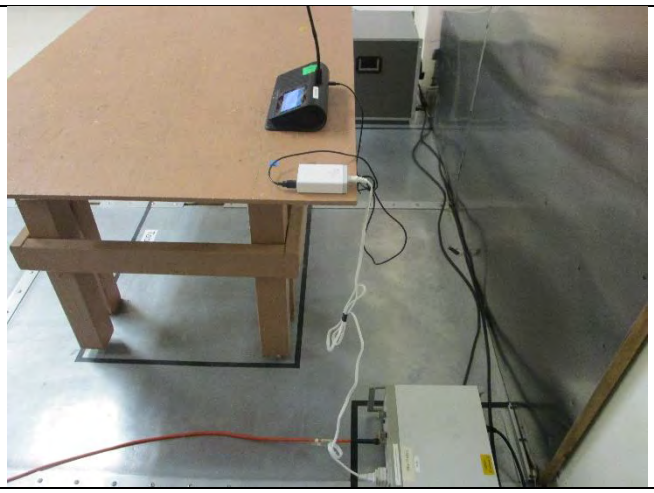
PCB 8 – Rear View

	
PCB 9 – Front View	PCB 9 – Rear View
	
NFC board Top View	NFC board Bottom View

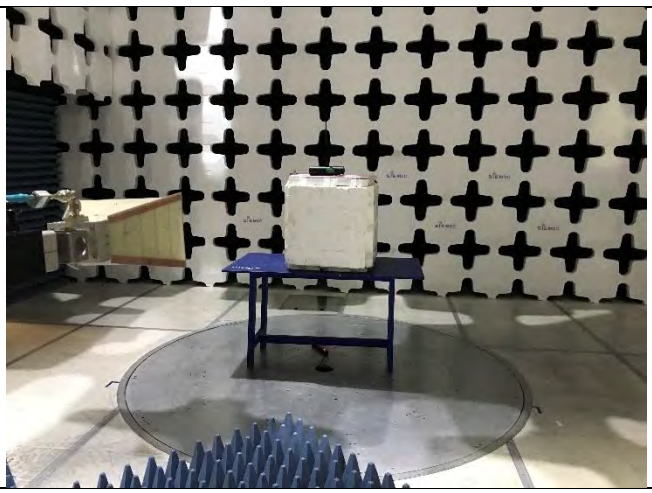
6.5 EUT Test Setup Photos



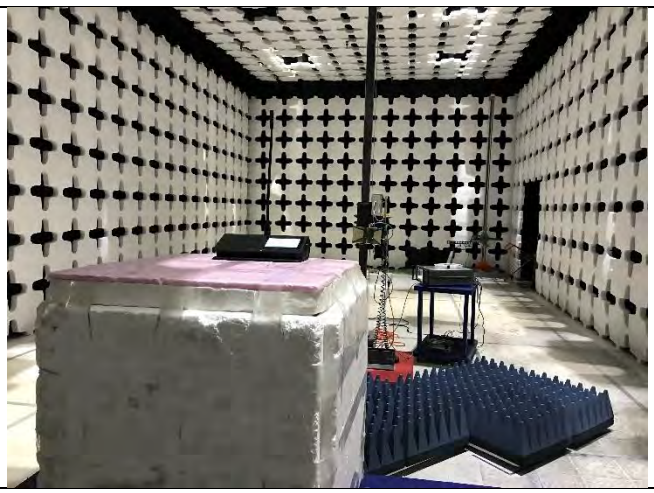
AC Conducted Emissions – Front View



AC Conducted Emissions – Side View

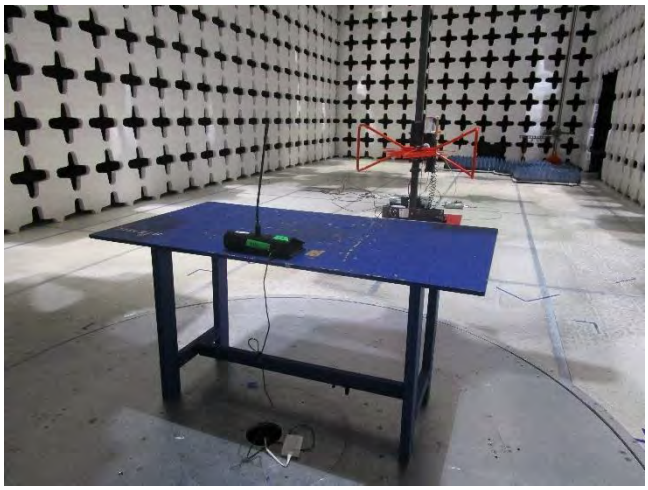


Radiated Emissions Above 1GHz– Front View



Radiated Emissions Above 1 GHz – Rear View

Radiated Emissions Below 1GHz– Front View



Radiated Emissions Below 1 GHz – 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					-

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	TeraTerm	Set the EUT to transmit continuously in diferent test mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.4 – 2014	☒ Pass ☐ N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass ☐ N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass ☐ N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	-	☐ Pass ☒ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass ☐ N/A
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass ☐ N/A
Frequency Stability	FCC	15.407 (g)	-	☐ Pass ☒ N/A
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	☐ Pass ☒ N/A
User Manual	FCC	-	-	☒ 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 Radiated Emissions (30MHz to 1GHz)

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

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

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

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

9.2 Radiated Emissions (1GHz to 40GHz)

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

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

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

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

9.3 RF conducted measurement

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

Some error sources that can contribute to the total uncertainty:

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

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

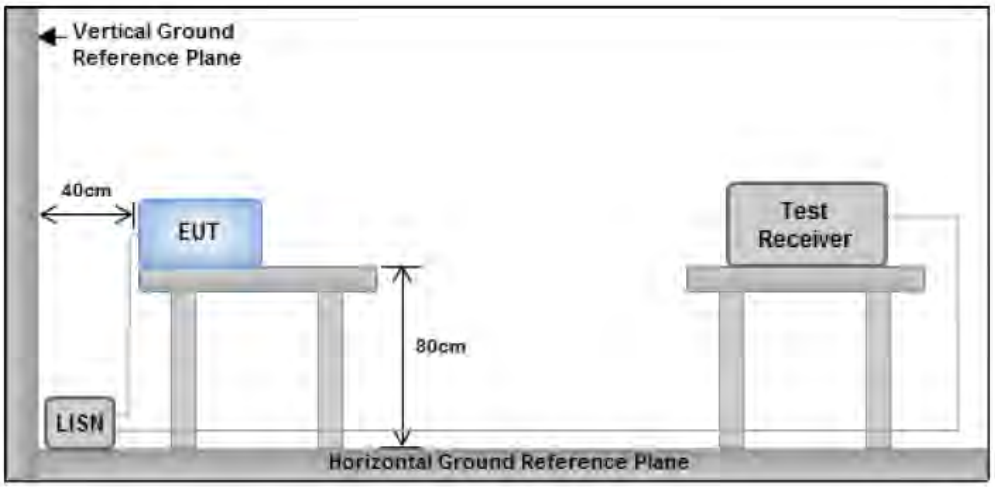
The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

10.1 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
RSS247(A8.1)	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 50μH/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 was tested at 120VAC, 60Hz		
Result	☒ Pass ☐ Fail		

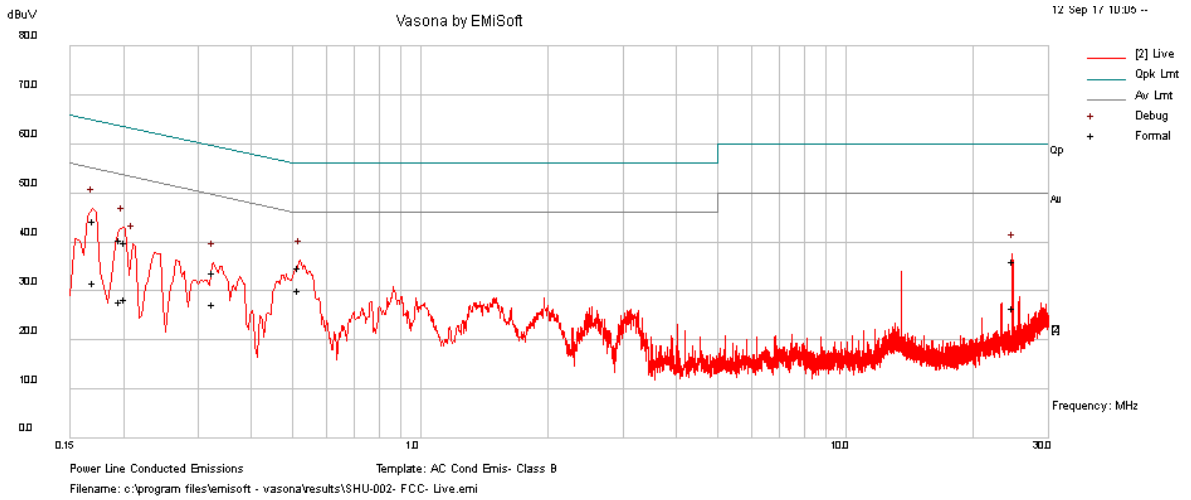
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at Conducted Emission 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:	09/12/2017			
Remarks	Power Supply, Live			

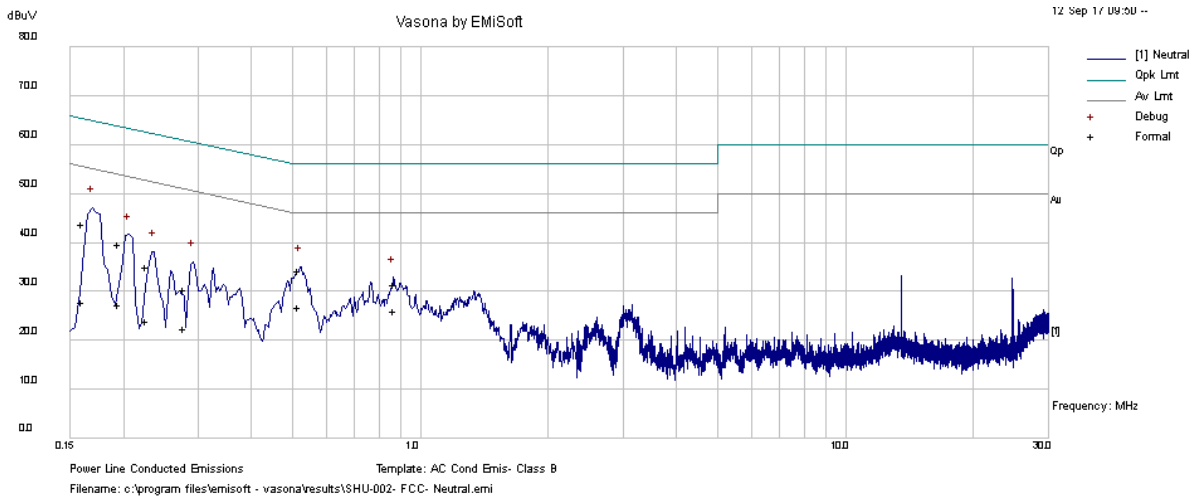


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.17	32.76	10	1.51	44.27	Quasi Peak	Live	64.98	-20.72	Pass
0.52	24.06	10.01	0.62	34.69	Quasi Peak	Live	56	-21.31	Pass
0.20	29.11	10	1.28	40.39	Quasi Peak	Live	63.79	-23.39	Pass
24.75	25.16	10.08	0.73	35.97	Quasi Peak	Live	60	-24.03	Pass
0.20	28.75	10	1.24	39.99	Quasi Peak	Live	63.52	-23.53	Pass
0.32	22.94	10.01	0.8	33.75	Quasi Peak	Live	59.58	-25.83	Pass
0.17	20.23	10	1.51	31.74	Average	Live	54.98	-23.24	Pass
0.52	19.51	10.01	0.62	30.14	Average	Live	46	-15.86	Pass
0.20	16.55	10	1.28	27.84	Average	Live	53.79	-25.95	Pass
24.75	15.72	10.08	0.73	26.53	Average	Live	50	-23.47	Pass
0.20	17.02	10	1.24	28.26	Average	Live	53.52	-25.26	Pass
0.32	16.62	10.01	0.8	27.43	Average	Live	49.58	-22.15	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:	09/12/2017			
Remarks	Power Supply, Neutral			

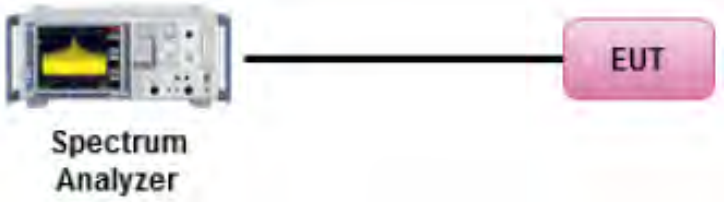


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.16	32.11	10	1.62	43.74	Quasi Peak	Neutral	65.47	-21.74	Pass
0.52	23.71	10.01	0.62	34.34	Quasi Peak	Neutral	56	-21.66	Pass
0.20	28.37	10	1.29	39.66	Quasi Peak	Neutral	63.81	-24.16	Pass
0.87	20.94	10.01	0.54	31.49	Quasi Peak	Neutral	56	-24.51	Pass
0.23	23.85	10	1.11	34.96	Quasi Peak	Neutral	62.56	-27.6	Pass
0.28	19.61	10	0.91	30.53	Quasi Peak	Neutral	60.89	-30.36	Pass
0.16	16.13	10	1.62	27.76	Average	Neutral	55.47	-27.72	Pass
0.52	16.06	10.01	0.62	26.69	Average	Neutral	46	-19.31	Pass
0.20	15.99	10	1.29	27.28	Average	Neutral	53.81	-26.54	Pass
0.87	15.4	10.01	0.54	25.95	Average	Neutral	46	-20.05	Pass
0.23	12.83	10	1.11	23.95	Average	Neutral	52.56	-28.62	Pass
0.28	11.61	10	0.91	22.52	Average	Neutral	50.89	-28.37	Pass

10.2 26 dB Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	-	26 dB Emission BW: Report only for reference.	☒
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	☐
Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01r02 26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz) - Allow the trace to stabilize. - 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 - Capture the plot. - Repeat above steps for different test channel and other modulation type.		
Test Date	09/11/2017	Environmental condition	Temperature 23°C 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 Gary Chou at RF test site.

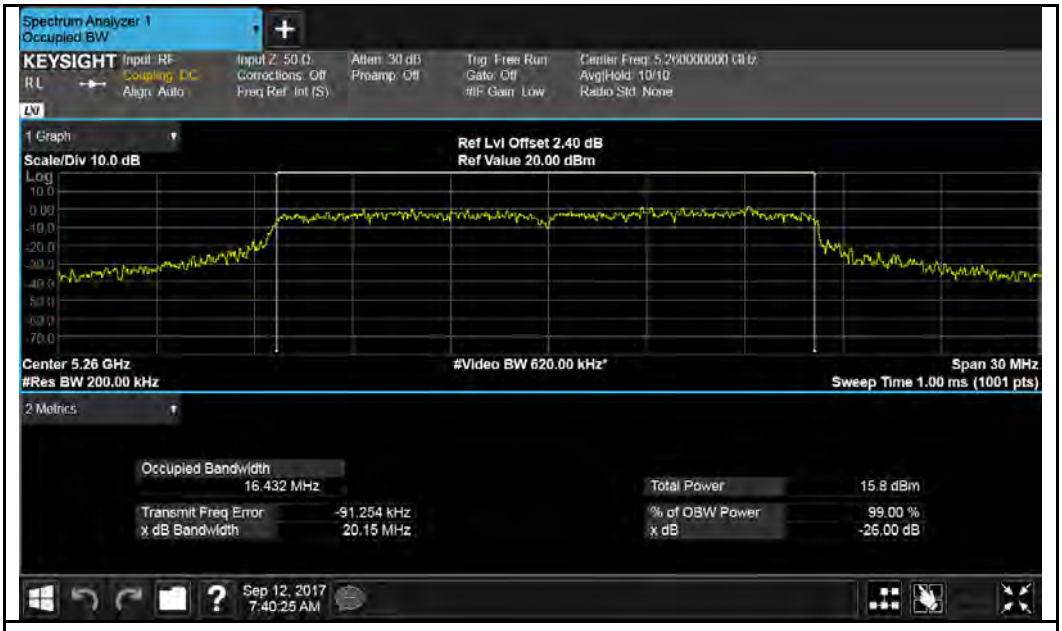
26dB Bandwidth measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5260	Low	20.15
	802.11a	5300	Mid	21.09
	802.11a	5320	High	20.20

26dB Bandwidth measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5500	Low	16.14
	802.11a	5600	Mid	16.27
	802.11a	5700	High	15.83

Bandwidth Test Plots
W53:



802.11a-5260MHz

802.11a-5300MHz

802.11a-5240MHz

W56:

802.11a-5745MHz

802.11a-5785MHz

802.11a-5825MHz

10.3 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	1	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.	☒

Test Setup				
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01r02 Measurement using a Power Meter (PM) Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required. - Connect EUT's RF output power to power meter - Set EUT to be continuous transmission mode - Measurement the average output power using power meter and record the result - Repeat above steps for different test channel and other modulation type.			
Test Date	09/11/2017	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	21°C 40% 1019mbar
Remark	N/A			
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.

Output Power measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11a	5260	Low	11.46	24	Pass
		5300	Mid	12.69	24	Pass
		5320	High	13.09	24	Pass

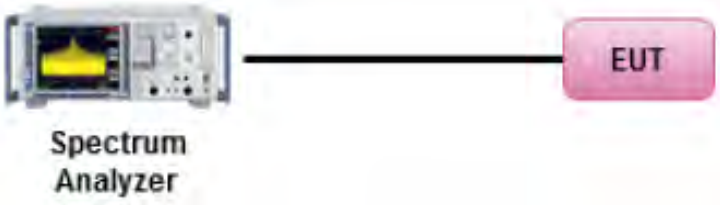
Output Power measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11a	5500	Low	11.50	24	Pass
		5600	Mid	11.97	24	Pass
		5700	High	12.03	24	Pass

10.4 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	1	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.	☒

Test Setup				
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01r02, 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	09/11/2017	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22°C 42% 1020mbar
Remark	N/A			
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
PSD	802.11a	5260	Low	0.11	11	Pass
		5300	Mid	1.21	11	Pass
		5320	High	1.53	11	Pass

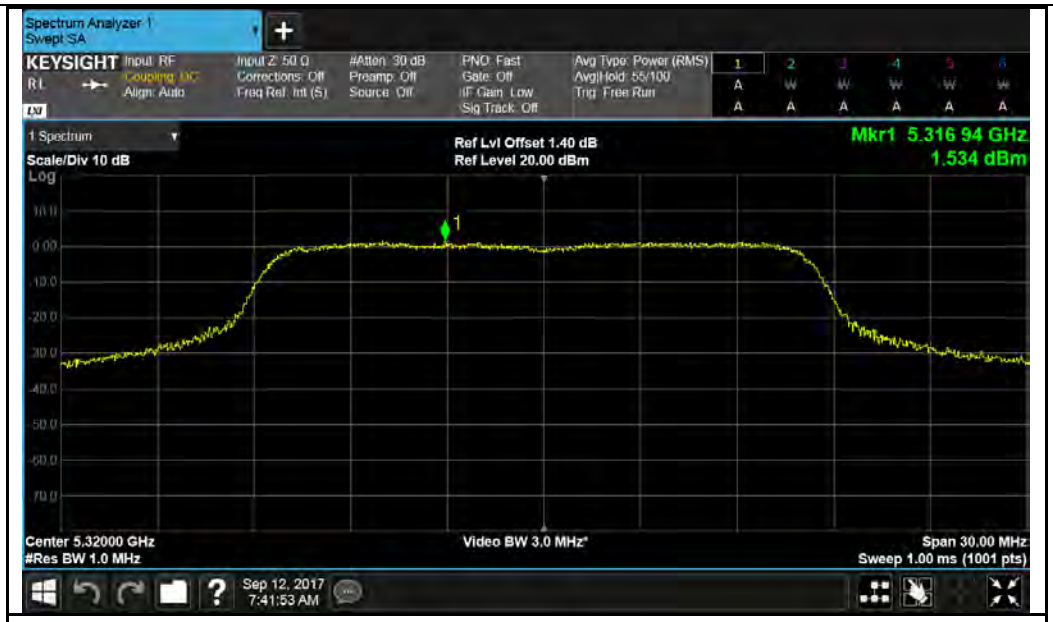
PSD measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)	Limit (dBm)	Result
PSD	802.11a	5500	Low	0.06	11	Pass
		5600	Mid	0.59	11	Pass
		5700	High	0.57	11	Pass

Test Plots
W53

802.11a-5260M

802.11a-5300M



802.11a-5320M

Test Plot for W56:

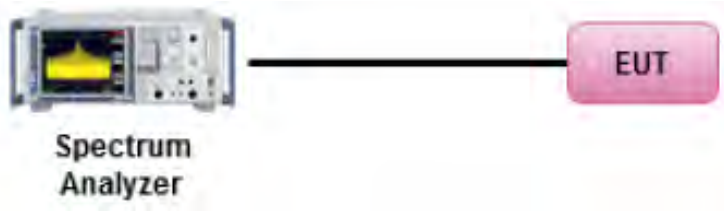
802.11a-5500M

802.11a-5600M

802.11a-5700M

10.5 Band Edge Measurement

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§ 15.407	(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 v01r02, 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=100kHz - Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.		
Remark	Antenna 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 Gary Chou at RF test site.

Test Plots for W53:

802.11a-5260MHz

802.11a-5320MHz

Test Plots for W56:

802.11a-5500MHz

802.11a-5700MHz

10.6 Dynamic Frequency Selection (DFS)

10.6.1 General introduction

Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectra density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

DFS Response requirement values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the UNII 99% transmission power bandwidth See Note 3.
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms

1. Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μ sec)	PRI (μ sec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup { (1/360) * (19*10^6/PRI_{usec}	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A	-		
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

2. Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μ sec)	Chirp Width (MHz)	PRI (μ sec)	Number of Pulses per *Burst*	Number of *Bursts*	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

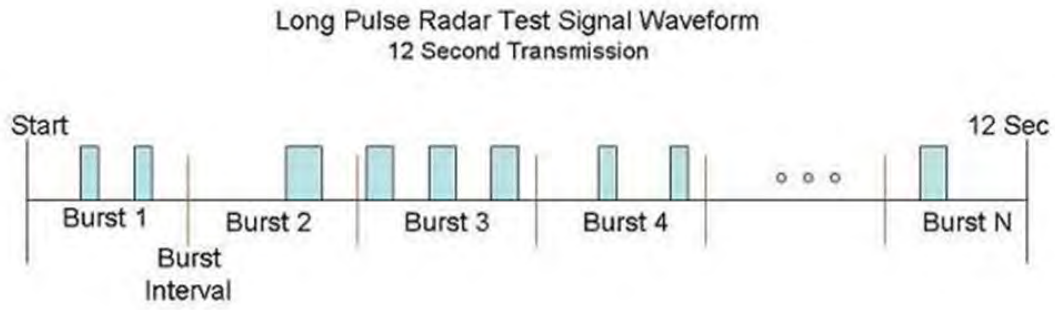
Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.

6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The s9tart time for each Burst is chosen independently.

A representative example of a Long Pulse radar test waveform:

1) The total test signal length is 12 seconds.
2) 8 Bursts are randomly generated for the Burst Count.
3) Burst 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).



3. Frequency Hopping Radar Type

Radar Type	Pulse Width (μ sec)	PRI (μ sec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	.333	300	70%	30

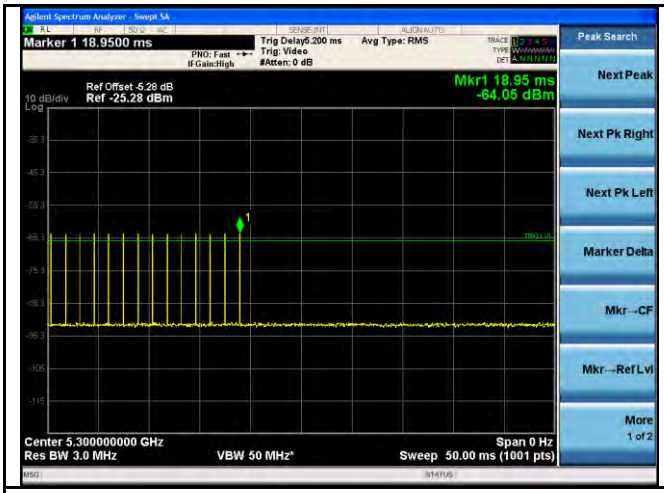
For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected 1 from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

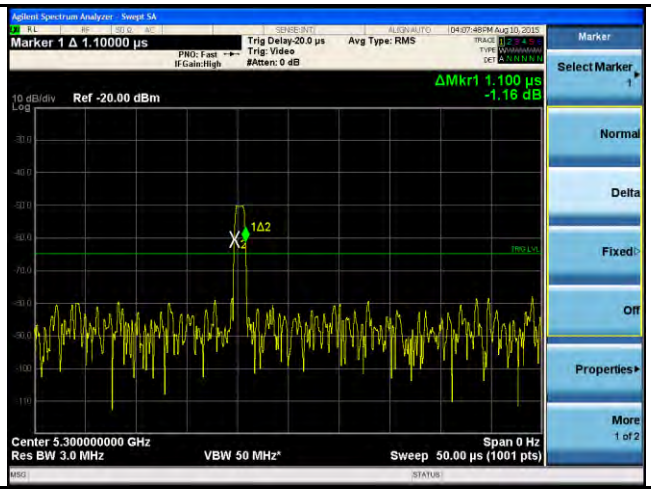
10.6.2 Radar Waveform Calibration

The following equipment setup was used to calibrate the conducted Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz.

Calibration Test Plots

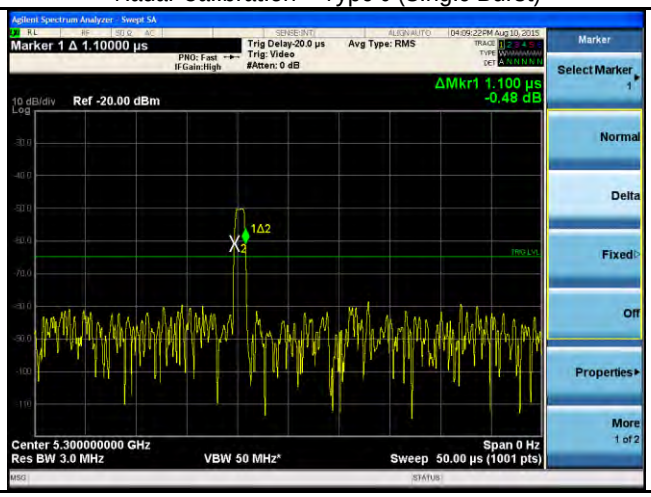


Radar Calibration - Type 0

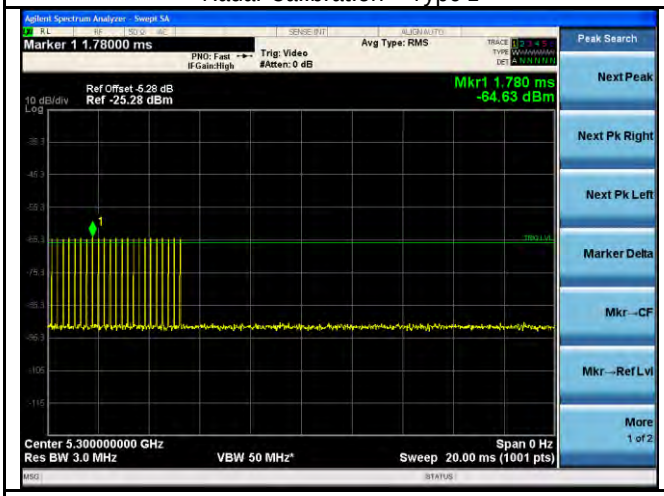


Radar Calibration - Type 0 (Single Burst)

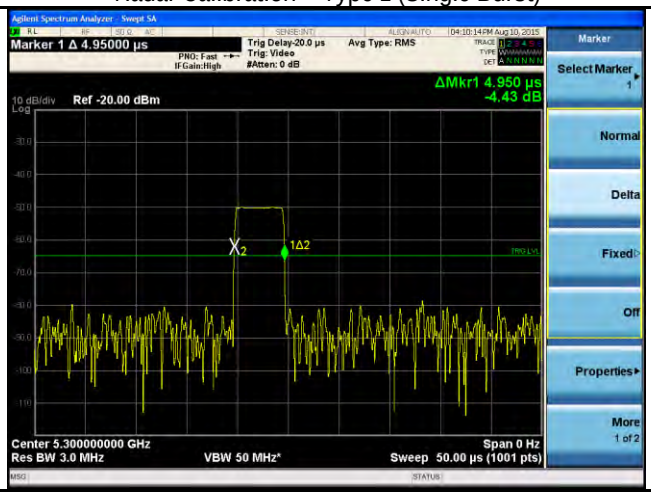
Radar Calibration - Type 1



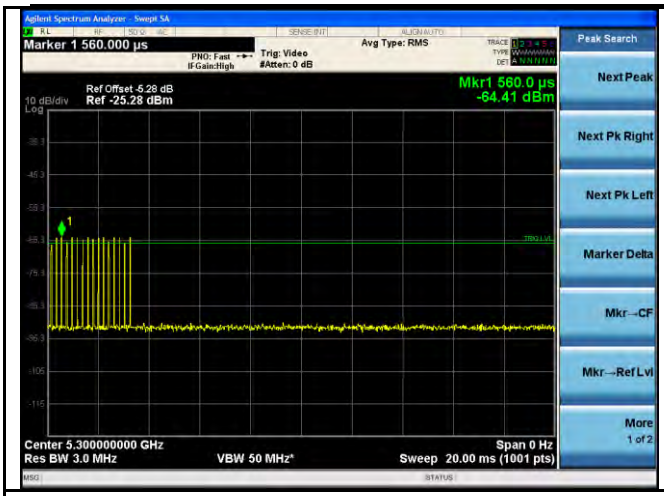
Radar Calibration - Type 1 (Single Burst)



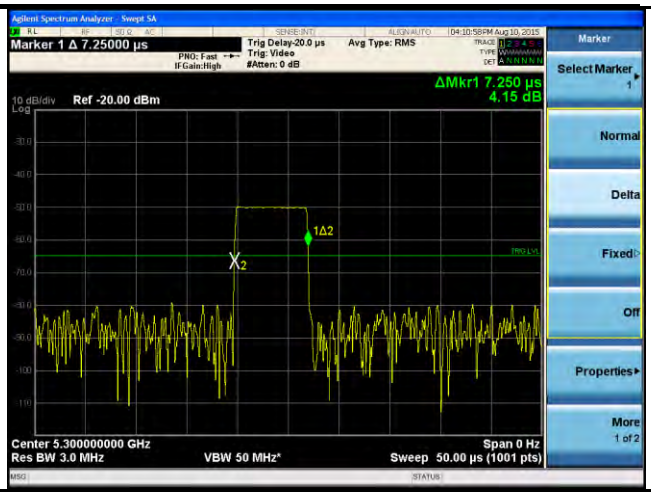
Radar Calibration - Type 2



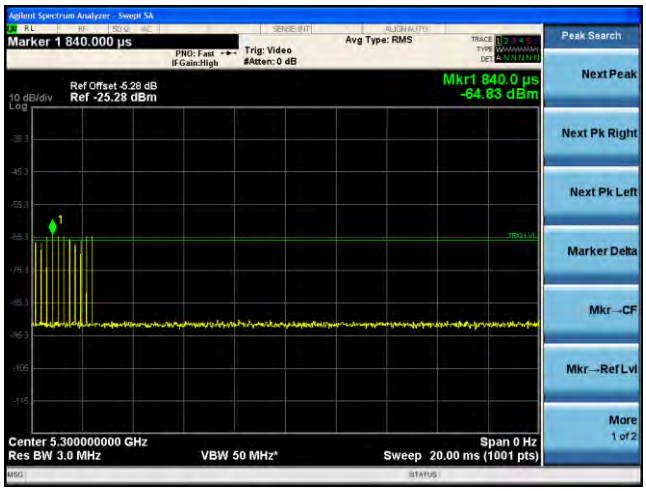
Radar Calibration - Type 2 (Single Burst)



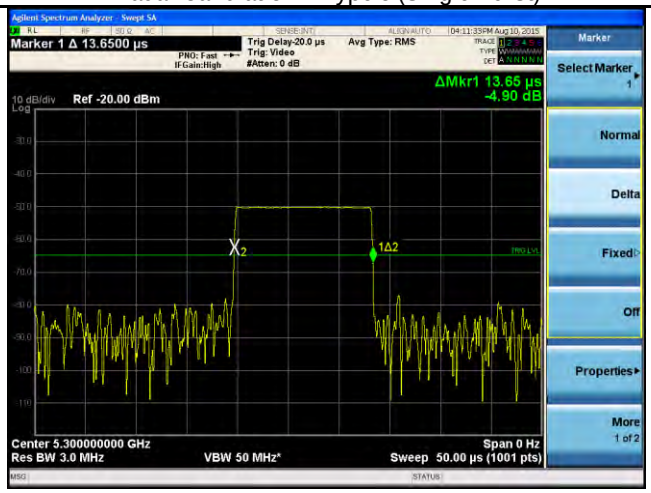
Radar Calibration - Type 3



Radar Calibration - Type 3 (Single Burst)

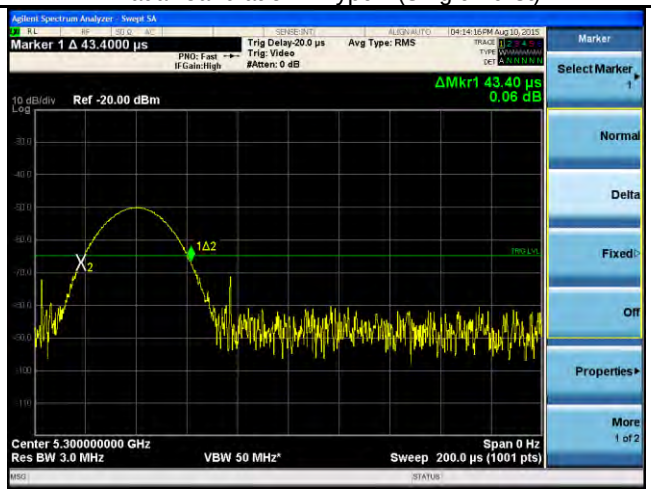


Radar Calibration - Type 4

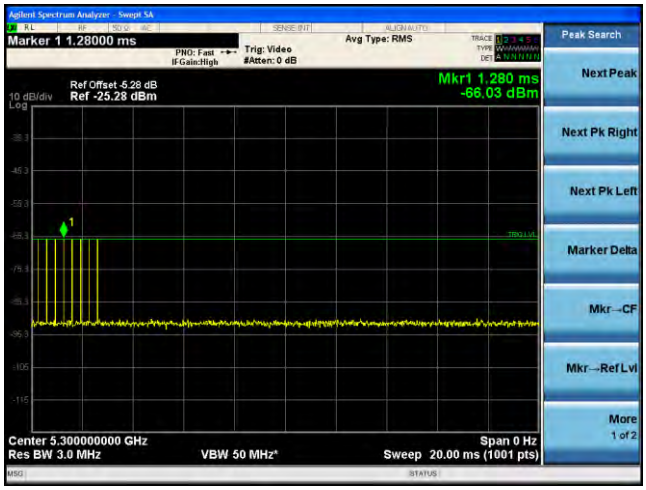


Radar Calibration - Type 4 (Single Burst)

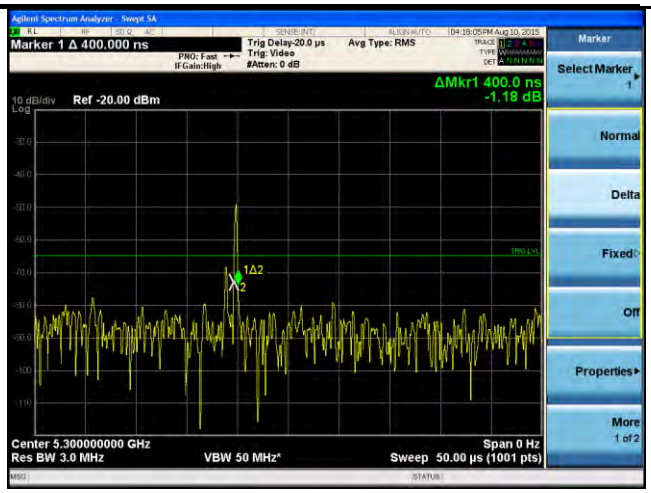
Radar Calibration - Type 5



Radar Calibration - Type 5 (Single Burst)



Radar Calibration - Type 6



Radar Calibration - Type 6 (Single Burst)

10.6.3 Test Procedure

In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

These tests define how the following DFS parameters are verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device.

UUT operating as a Client Device will associate with the (Master) at Mid Channel. DFS testing while the System testing was performed with the designated MPEG test file that streams full motion video at 30 frames per second from the Master to the Client IP based system

At time T0 the Radar Waveform generator sends a Burst of pulses for each of the radar types.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the DFS Response requirement values table.

Channel Closing Transmission Time- Measurement

A type 1 waveform was introduced to the EUT and the Spectrum Analyzer sweep time was set to 1s for monitoring and capturing the plot. A LabView program was created to collect trace data and capturing the plot. The program will calculate the channel closing time base on the spectrum analyzer result. The result will be calculated based on FCC procedure.

C= N*Dwell

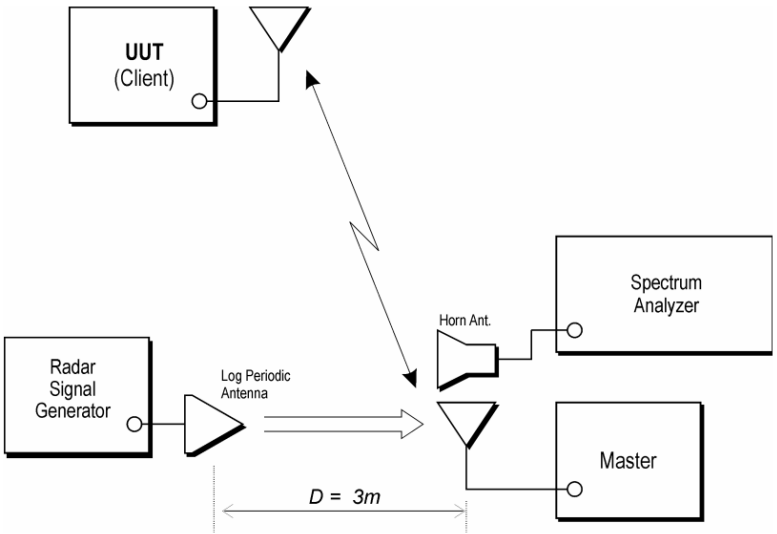
C is the closing time, N is the number of spectrum analyzer sampling bins showing a U-NII transmission and dwell is the dwell time per bin.

Dwell= S/B

Where Dwell is the dwell time per spectrum analyzer sampling bin, S is the sweep time and B is the number 0f spectrum analyzer sampling bins.

10.6.4 DFS Test Setup

Test Setup Block Diagram



The radio was set at the center channel frequency of tested Channel.
A FCC approved Master device was used to link with the UUT (client) device.

For the frequency bands 5470MHz to 5725MHz the master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

The rated output power of the Master unit is > 23 dBm (EIRP). Therefore the required interference threshold is – 64 dBm. After correction for procedural adjustment, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS detection threshold level is set to -64 dBm. The tested level is lower than the required level hence it provides margining to the limit.

10.6.4.1 In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

These tests define how the following DFS parameters are verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client Device will associate with the UUT (Master) at Mid Channel. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test.

At time T0 the Radar Waveform generator sends a Burst of pulses for each of the radar types at -64dBm.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the DFS Response requirement values table.

Channel Closing Transmission Time- Measurement

A type 1 waveform was introduced to the EUT and the Spectrum Analyzer sweep time was set to 1s for monitoring and capturing the plot. A LabView program was created to collect trace data and capturing the plot. The program will calculate the channel closing time base on the spectrum analyzer result. The result will be calculated based on FCC procedure.

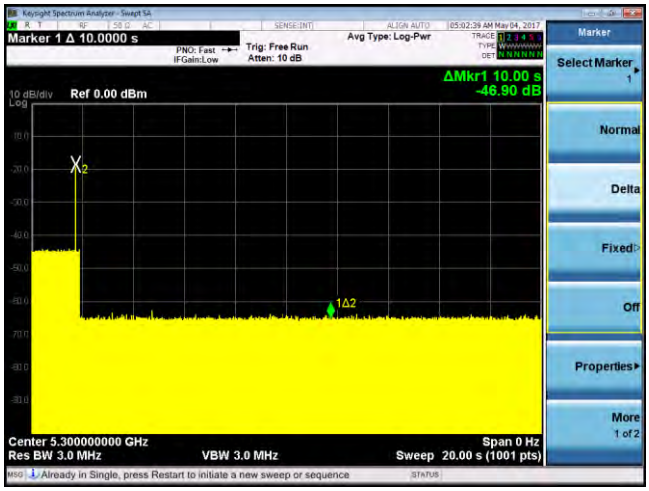
C= N*Dwell

C is the closing time, N is the number of spectrum analyzer sampling bins showing a U-NII transmission and dwell is the dwell time per bin.

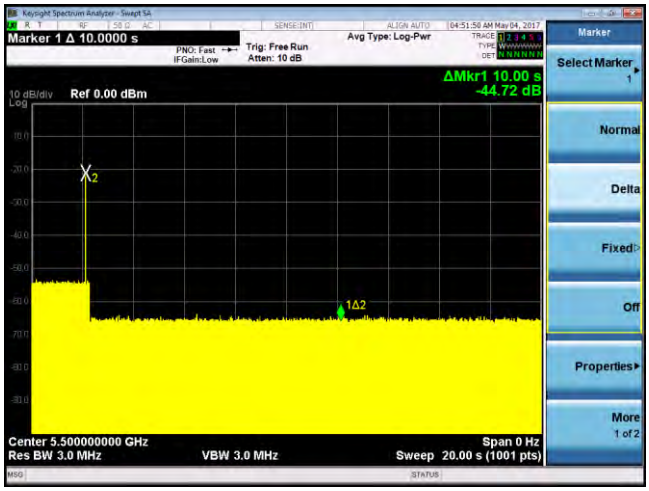
Dwell= S/B

Where Dwell is the dwell time per spectrum analyzer sampling bin, S is the sweep time and B is the number 0f spectrum analyzer sampling bins.

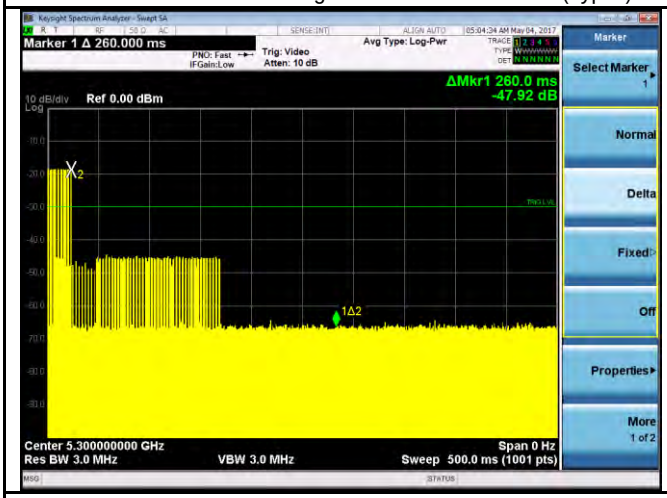
Test Result



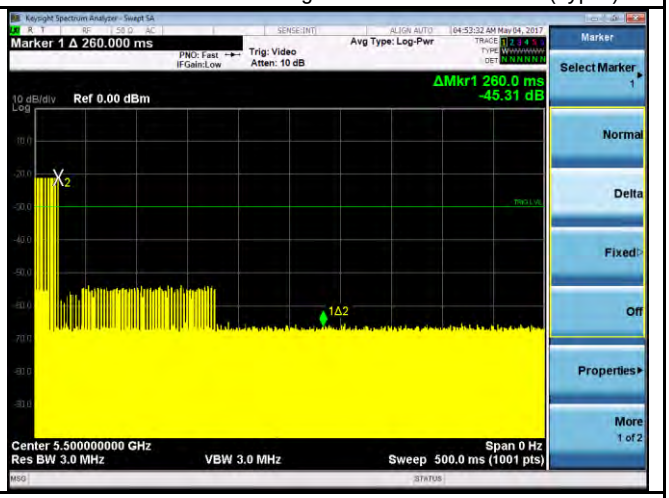
Channel Move Time& Closing Time - 802.11a-5300MHz (Type0)



Channel Move Time& Closing Time - 802.11a-5500MHz (Type0)



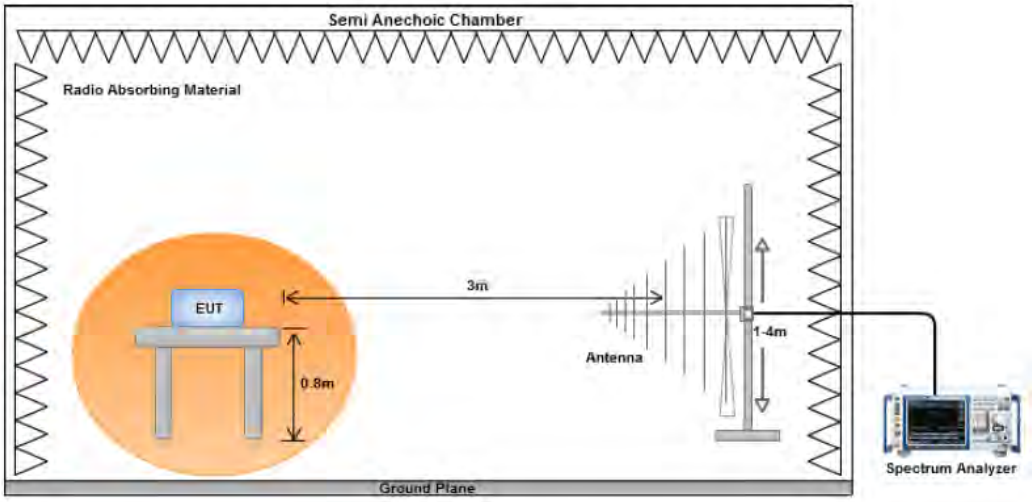
Channel Move Time& Closing Time - 802.11a-5300MHz (Type0)



Channel Move Time& Closing Time - 802.11a-5500MHz (Type0)

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>

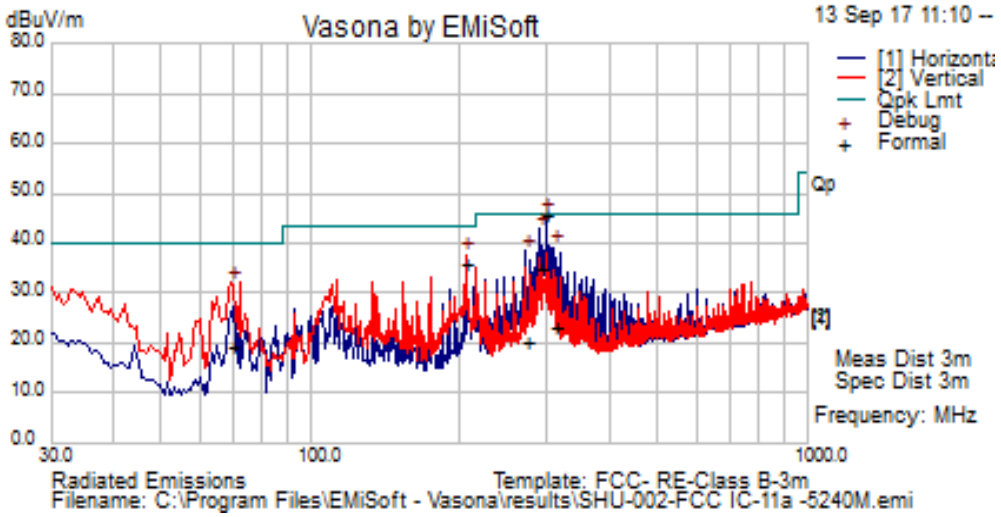
Test Data ☒ Yes (See below) ☐ N/A

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	Result	Pass
	Humidity (%)	47		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Gary Chou			
Test Date:	09/13/2017			
Remarks:	802.11a – 5600MHz			

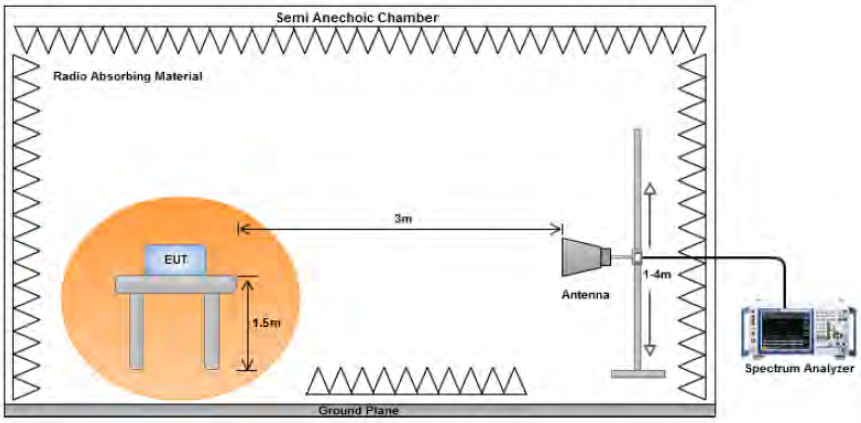


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
297.52	55.21	13.42	-23.2	45.44	Quasi Max	H	144	176	46	-0.56	Pass
290.28	44.75	13.39	-23.19	34.95	Quasi Max	H	148	155	46	-11.05	Pass
205.18	47.16	12.88	-24.21	35.83	Quasi Max	V	142	349	43.5	-7.67	Pass
309.65	32.72	13.5	-23.09	23.13	Quasi Max	H	197	129	46	-22.87	Pass
271.19	30.36	13.32	-23.6	20.09	Quasi Max	H	313	74	46	-25.91	Pass
69.57	35.34	11.7	-28.13	18.91	Quasi Max	H	237	335	40	-21.09	Pass

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

10.8 Radiated Spurious Emissions above 1GHz

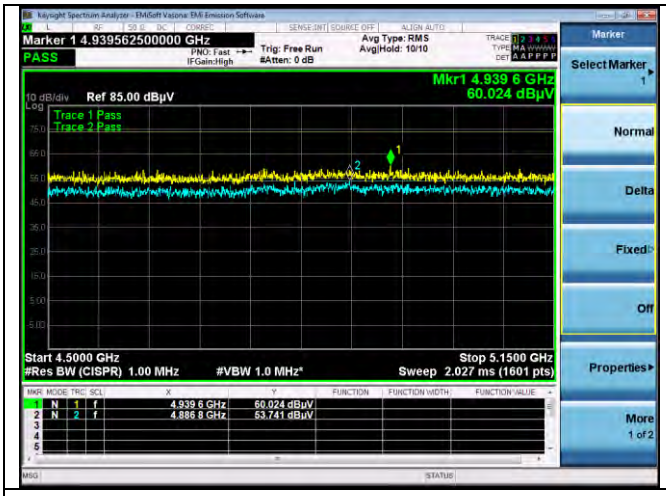
Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6)	(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.	☒
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		

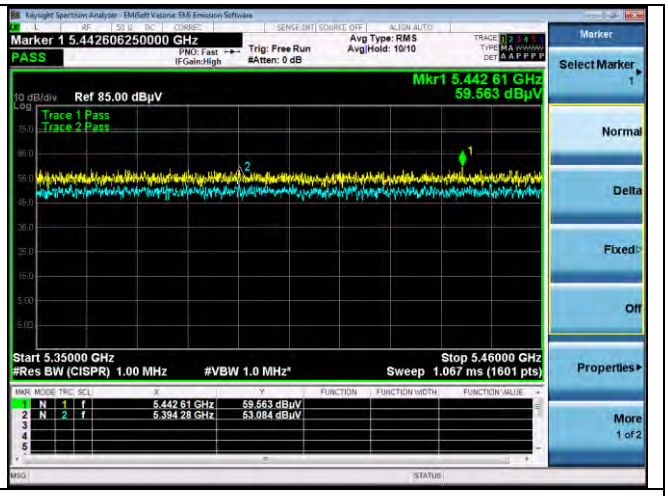
Test Data ☒ Yes (See below) ☐ N/A
Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Gary Chou at 10m chamber.

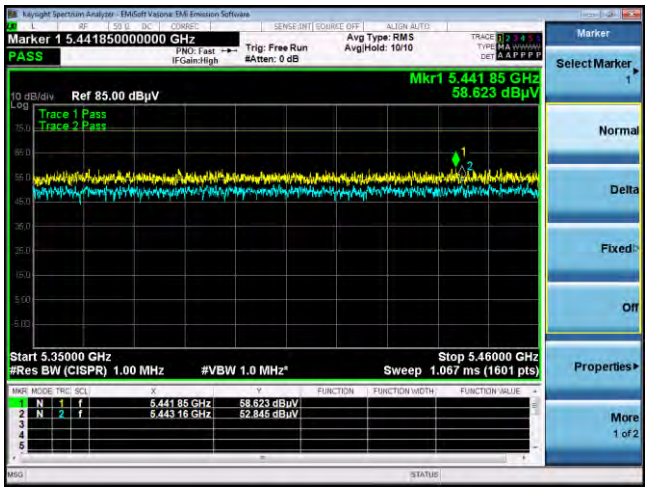
Radiated Restricted band Measurement Plots:



802.11a 5260M(4500-5150MHz)



802.11a 5320M(5350-5460MHz)



802.11a 5500M(5350-5460MHz)

Radiated Emission Test Results (Above 1GHz)

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
15783.36	39.18	8.54	3.24	50.96	Peak Max	H	196	300	74	-23.04	Pass
10518.23	38.27	7.26	0.35	45.88	Peak Max	V	194	316	74	-28.12	Pass
15783.36	14.36	8.54	3.24	26.14	Average Max	V	122	194	54	-27.86	Pass
10518.23	13.47	7.26	0.35	21.08	Average Max	H	299	171	54	-32.92	Pass

Above 1GHz-40GHz – 802.11a – 5300MHz

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
15899.42	38.32	8.56	3.16	50.04	Peak Max	V	220	148	74	-23.96	Pass
10598.37	38.53	7.39	0.19	46.11	Peak Max	H	227	329	74	-27.89	Pass
15899.42	14.16	8.56	3.16	25.88	Average Max	V	220	148	54	-28.12	Pass
10598.37	13.27	7.39	0.19	20.85	Average Max	H	227	329	54	-33.15	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
15957.15	38.43	8.56	3.3	50.29	Peak Max	V	216	160	74	-23.71	Pass
10640.36	39.42	7.46	0.36	47.24	Peak Max	H	283	168	74	-26.76	Pass
15957.15	14.45	8.56	3.3	26.31	Average Max	H	105	23	54	-27.69	Pass
10640.36	13.24	7.46	0.36	21.06	Average Max	V	185	188	54	-32.94	Pass

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
16503.25	39.23	8.75	5.89	53.87	Peak Max	V	284	344	74	-20.13	Pass
11000.18	39.14	8.02	1.5	48.66	Peak Max	V	305	15	74	-25.34	Pass
16503.25	18.45	8.75	5.89	33.09	Average Max	V	284	344	54	-20.91	Pass
11000.18	13.26	8.02	1.5	22.78	Average Max	V	305	15	54	-31.22	Pass

Above 1GHz-40GHz – 802.11a – 5600MHz

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
11200.29	38.37	7.24	2.36	47.97	Peak Max	H	238	279	74	-26.03	Pass
11200.29	15.42	7.24	2.36	25.02	Average Max	V	263	3	54	-28.98	Pass
16800.17	39.63	8.53	5.96	54.12	Peak Max	V	174	79	74	-19.88	Pass
16800.17	16.14	8.53	5.96	30.63	Average Max	H	198	140	54	-23.37	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
11398.24	38.25	7.68	2.36	48.29	Peak Max	H	238	279	74	-25.71	Pass
11398.24	15.36	7.68	2.36	25.4	Average Max	V	263	3	54	-28.6	Pass
17101.35	39.43	8.97	5.96	54.36	Peak Max	V	174	79	74	-19.64	Pass
17101.35	16.52	8.97	5.96	31.45	Average Max	H	198	140	54	-22.55	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	04/21/2017	1 Year	04/21/2018	☑
CHASE LISN	MN2050B	1018	08/16/2017	1 Year	08/16/2018	☑
Radiated Emissions						
Keysight EXA 44GHz Spectrum Analyzer	N9010A	MY51440112	11/02/2016	1 Year	11/02/2017	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	01/13/2017	1 Year	01/13/2018	☑
Horn Antenna (1GHz~26GHz)	3115	100059	08/11/2017	1 Year	08/11/2018	☑
Horn Antenna (18GHz~40GHz)	PA-840	181251	06/23/2017	1 Year	06/23/2018	☑
Preamplifier (100KHz-7GHz)	LPA-6-30	11170602	02/09/2017	1 Year	02/09/2018	☑
Pre-Amplifier (1-40GHz)	SAS-474	579	05/04/2017	1 Year	05/04/2018	☑
10 Meters SAC	10M	N/A	09/06/2017	1 Year	09/06/2018	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	11/16/2016	1 Year	11/16/2017	☑

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