

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT AND INDUSTRY CANADA RSS 247 CLASS II & IV PC REPORT

OF

Applicant: silex technology, Inc.
2-3-1 Hikaridai, Seika-cho, Souraku-gun, Kyoto 619-0237

Product Name: Embedded wireless module

Brand Name: Silex

Model No.: SX-SDMAC

Model Difference: N/A

Report Number: T190524W02-RP

FCC ID: N6C-SDMAC

IC: 4908A-SDMAC

FCC Rule Part: §15.407, Cat: NII

IC Rule: RSS-247 issue 2 Feb 2017

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Date of EUT Received: May 24, 2019

Issued by Compliance Certification Services Inc. Wugu Lab.
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The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Tested By:

Jerry Lu

Jerry Lu / Sr. Engineer

Kevin Tsai

Approved By:

Kevin Tsai / Deputy Manager



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Revision History

Report Number	Revision	Description	Effectuated Page	Issue Date	Revised By
T190524W02-RP	Rev.00	Initial creation of document	All	Jun. 11, 2019	Elle Chang

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Embedded wireless module
Brand Name:	Silex
Model No.:	SX-SDMAC
Model Difference:	N/A
Product SW/HW version:	1.0.0.12 / N/A
Power Supply:	3.3 VDC from Power supply
Class II & Class IV Permissive change:	Enabling channels 144 (HT20), 142 (HT40), 138 (HT80) in UNII bands.

WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Avg. Power (dBm)	Modulation Technology
11a	5470~5725	1	6.45	OFDM
11n_HT / ac_VHT 20M	5470~5725	1	HT: 6.03	OFDM
11n_HT / ac_VHT 40M	5470~5725	1	HT: 7.12	OFDM
11ac_VHT80M	5470~5725	1	8.17	OFDM
Antenna Designation:	PCB Antenna, Peak Gain: 3.5dBi			
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 - 150.0Mbps 802.11 ac_20MHz: 6.5 –86.7Mbps 802.11 ac_40MHz: 13.5 -200.0Mbps 802.11 ac_80MHz: 29.3 – 433.3Mbps			
Modulation Technology	11a/n: OFDM (64QAM,16QAM, QPSK, BPSK) 11ac:OFDM (64QAM,16QAM, QPSK, BPSK, 256QAM)			

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 v01r04 General UNII Test Procedures New Rules

RSS-247 issue 2 Feb. 2017

RSS-Gen. issue 5 Apr. 2018

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd.,

Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) (TAF code 1309)

FCC Designation number: TW1309

Canada Registration number: 2324G

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration

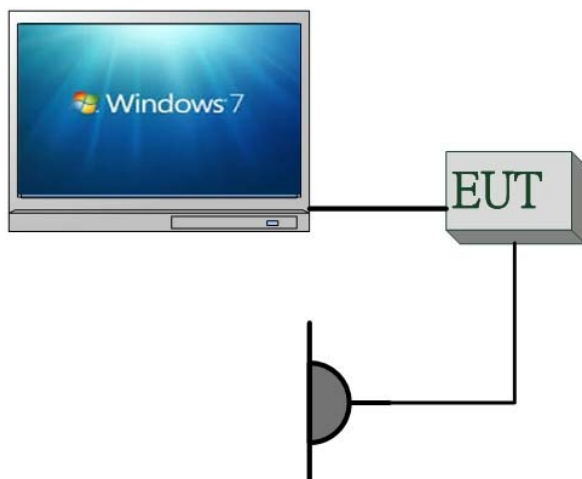


Fig.2-3 Conducted Emission (Antenna Port) Configuration

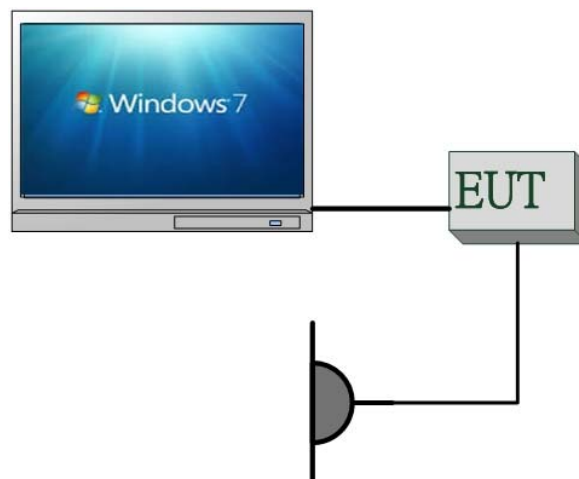


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	T420	S0012407	Shielded	Unshielded

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3 SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.403(i) §15.407(e)	RSS-247 §6.2.1~ 4 (1) RSS-Gen §6.7	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.407(g)	RSS-Gen §6.11	Frequency Stability	Compliant
§15.203 §15.407(a)	RSS- Gen §6.8	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5470 MHz ~5725 MHz:

1 channels are provided for 802.11a, 802.11n_HT20, 802.11ac_VHT20

CHANNEL	FREQUENCY
144	5720 MHz

1 channels are provided for 802.11n_HT40, 802.11ac_VHT40

CHANNEL	FREQUENCY
142	5710 MHz

1 channels are provided for 802.11ac_VHT80

CHANNEL	FREQUENCY
138	5690 MHz

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.
4. The given UE is pre-scanned among 802.11n and ac modes, and 802.11n yields the highest reading that generates the highest emission.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	FREQUENCY BAND (MHz)	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5500~5720	144	OFDM	6	Ch0
802.11n_HT20	5500~5720	144	OFDM	MCS0	Ch0
802.11n_HT40	5510~5710	142	OFDM	MCS0	Ch0
802.11ac_VHT80	5530~5690	138	OFDM	MCS0	Ch0

RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	FREQUENCY BAND (MHz)	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5500~5720	144	OFDM	6	Ch0
802.11n_HT20	5500~5720	144	OFDM	MCS0	Ch0
802.11n_HT40	5510~5710	142	OFDM	MCS0	Ch0
802.11ac_VHT80	5530~5690	138	OFDM	MCS0	Ch0

Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n/ac WLAN Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	FREQUENCY BAND (MHz)	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5500~5720	144	OFDM	6	Ch0
802.11n_HT20 802.11ac_VHT20	5500~5720	144	OFDM	MCS0	Ch0
802.11n_HT40 802.11ac_VHT40	5510~5710	142	OFDM	MCS0	Ch0
802.11ac_VHT80	5530~5690	138	OFDM	MCS0	Ch0

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5 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575 dB
26dB & 6dB Emission Bandwidth	+/- 147.256 Hz
The Maximum Output Power	+/- 1.924 dB
Peak Power Spectral Density	+/- 2.038 dB
Frequency Stability	+/- 147.256 Hz
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12 dB
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68 dB
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18 dB
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47 dB
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81 dB
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87 dB

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

Mode	Duty Cycle (%)	Duty Factor (dB) = $10 \cdot \log(1/\text{Duty Cycle})$	1/T (kHz)	VBW setting (kHz)
802.11a	95.73	0.19	0.48	1.00
802.11n_20	95.57	0.20	0.52	1.00
802.11n_40	91.44	0.39	1.06	2.00
802.11ac_80	84.05	0.75	2.15	3.00

Duty Cycle Factor: $10 \cdot \log(1/0.9573) = 0.19$

Duty Cycle Factor: $10 \cdot \log(1/0.9557) = 0.2$

Duty Cycle Factor: $10 \cdot \log(1/0.9144) = 0.39$

Duty Cycle Factor: $10 \cdot \log(1/0.8405) = 0.75$

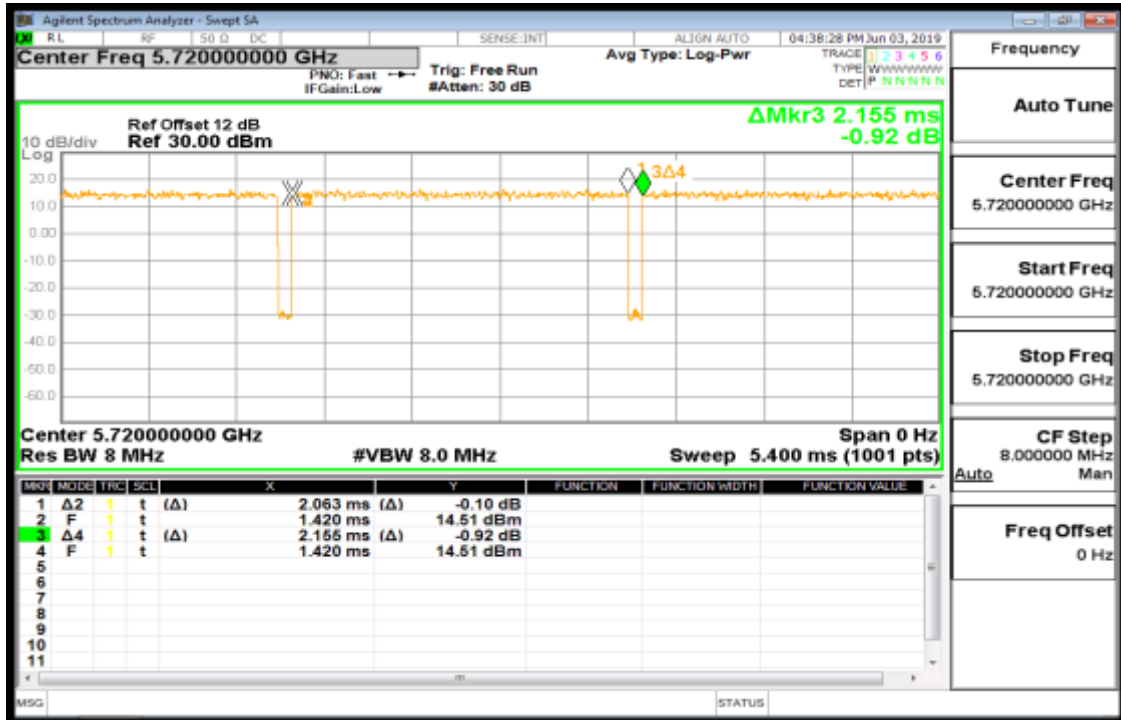
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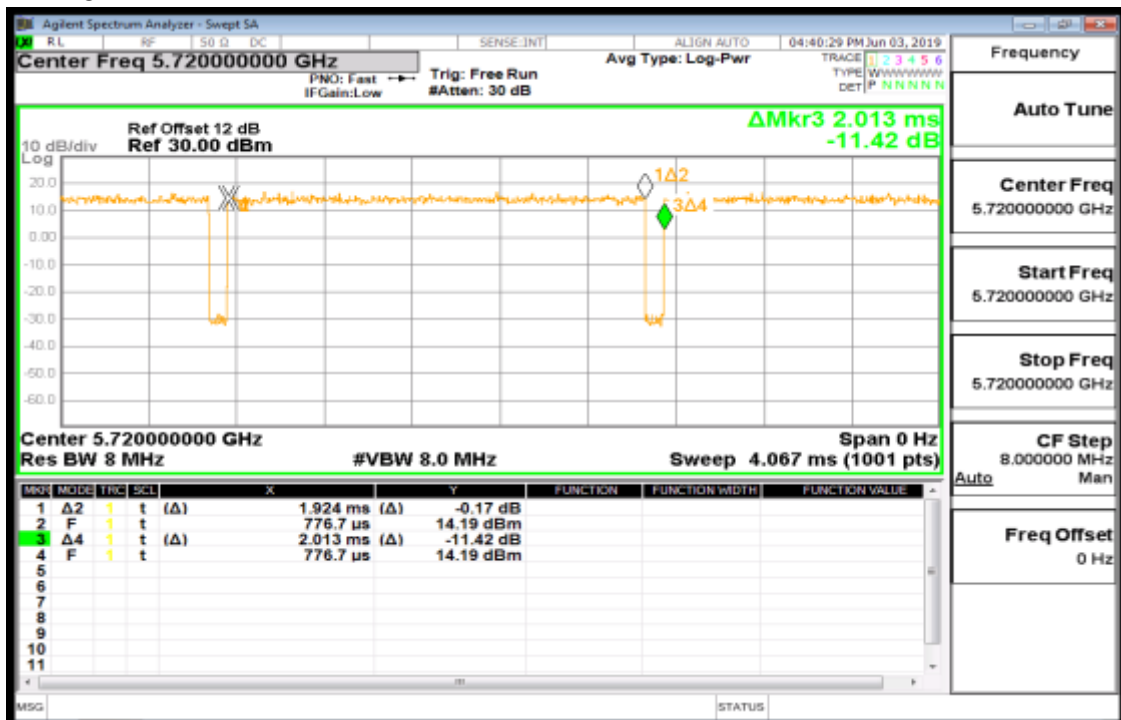
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DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20

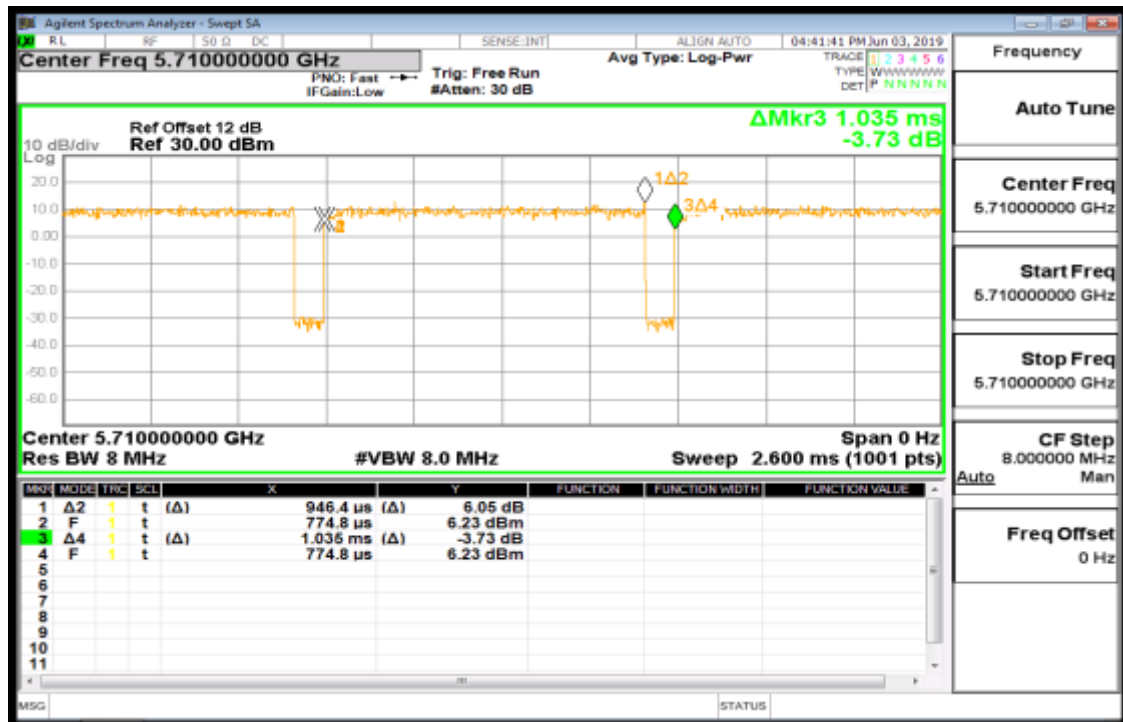


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802.11n HT 40



802.11 ac VHT 80



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7 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

7.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

7.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
 - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all test default channel measured were complete.

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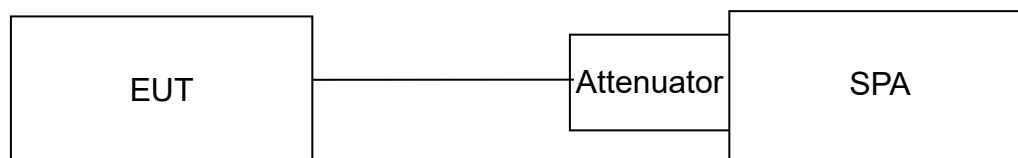
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7.3 Measurement Equipment Used

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	02/13/2019	02/12/2020
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2018	10/07/2019
DC Block	Mini-Circuits	BLK-18-S+	31129(1)	02/26/2019	02/25/2020
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020

7.4 Test Set-up



7.5 Measurement Result

26dB Bandwidth

802.11a_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	15.04	11.772
5720 (U-NII 3)	4.6	6.628

802.11n_HT20_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	15.2	11.818
5720 (U-NII 3)	5.44	7.356

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802.11n_HT40_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5710 (U-NII 2C)	34.68	15.401
5710 (U-NII 3)	5.24	7.193

802.11ac_VHT80_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5690 (U-NII 2C)	75.32	18.769
5690 (U-NII 3)	5.8	7.634

99% Bandwidth

802.11a_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	13.1605	11.193
5720 (U-NII 3)	3.1605	4.998

802.11n_HT20_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5720(U-NII 2C)	13.7405	11.380
5720 (U-NII 3)	3.7405	5.729

802.11n_HT40_Ch0

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5710(U-NII 2C)	32.894	15.171
5710 (U-NII 3)	2.894	4.615

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802.11ac _VHT80_Ch0

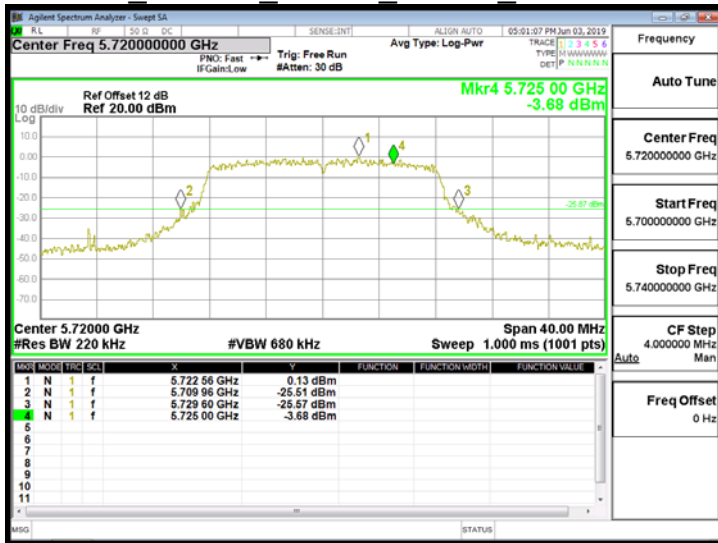
Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5690(U-NII 2C)	72.5085	18.604
5690 (U-NII 3)	2.5085	3.994

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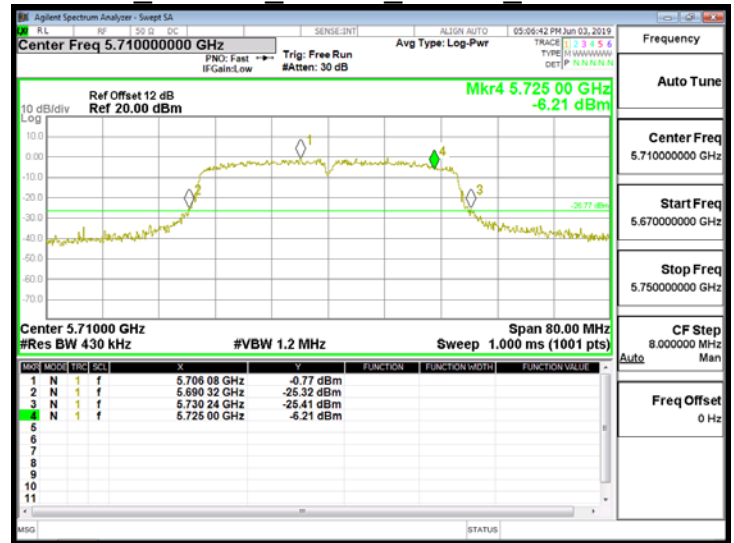
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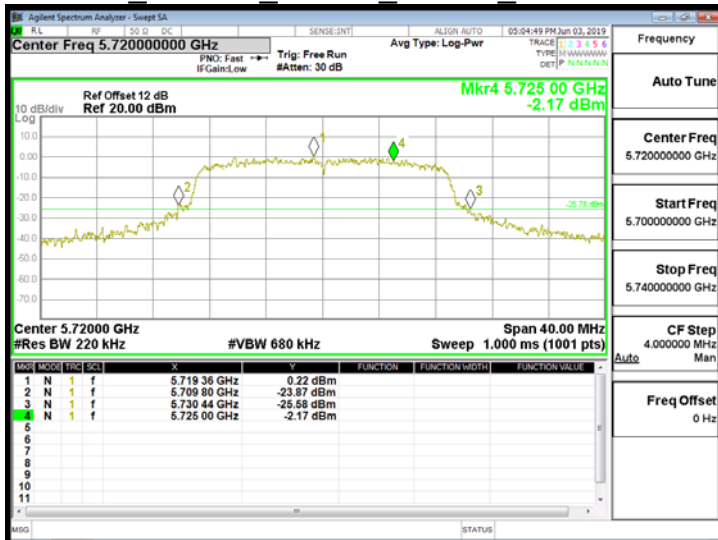
FCC 802.11a 20MHz Chain0 5720MHz



FCC 802.11n 40MHz Chain0 5710MHz



FCC 802.11n 20MHz Chain0 5720MHz



FCC 802.11ac 80MHz Chain0 5690MHz

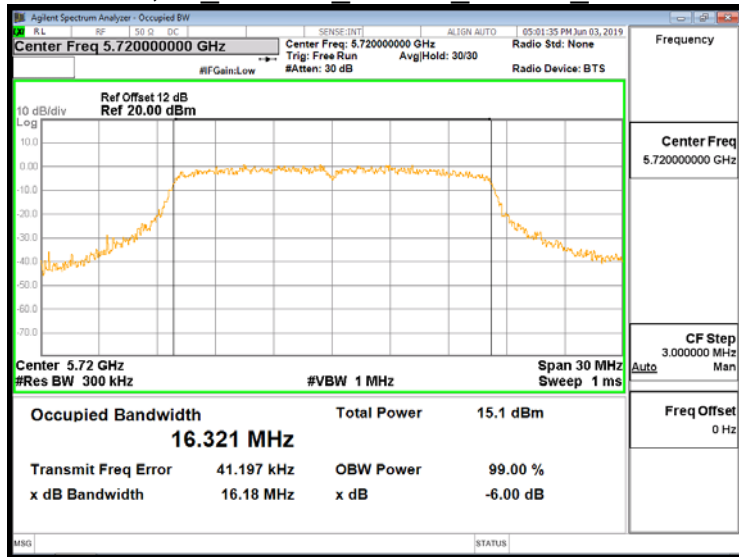


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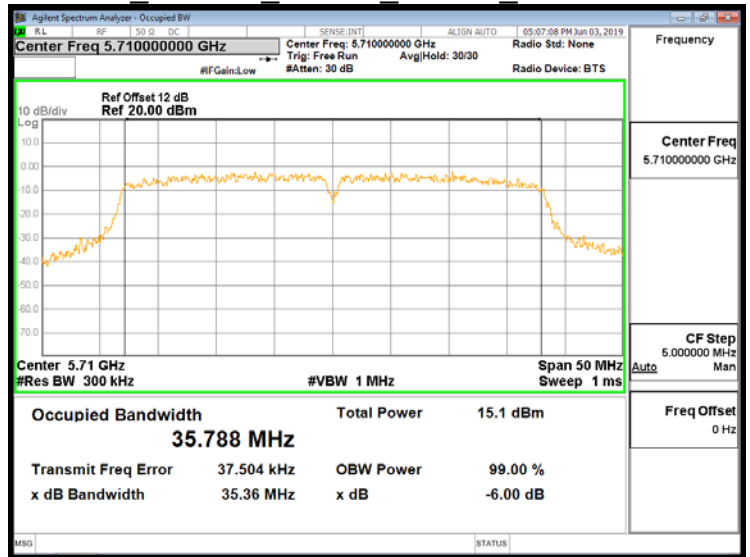
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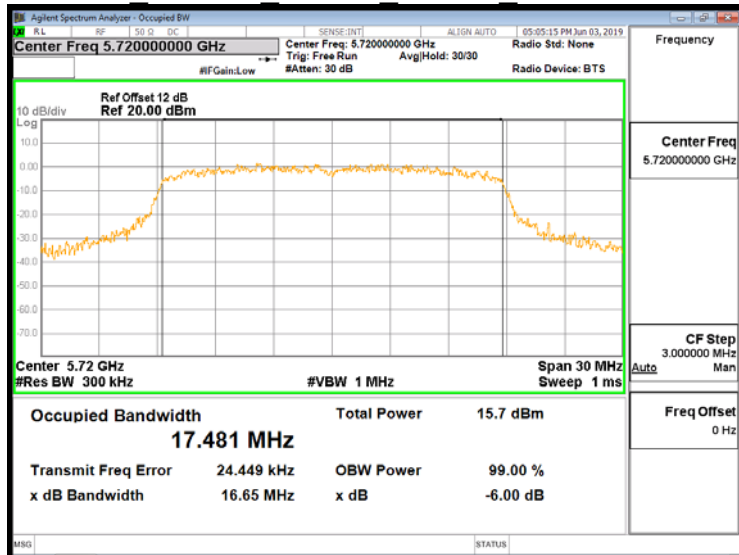
For 99%, IC 802.11a 20MHz Chain0 5720MHz



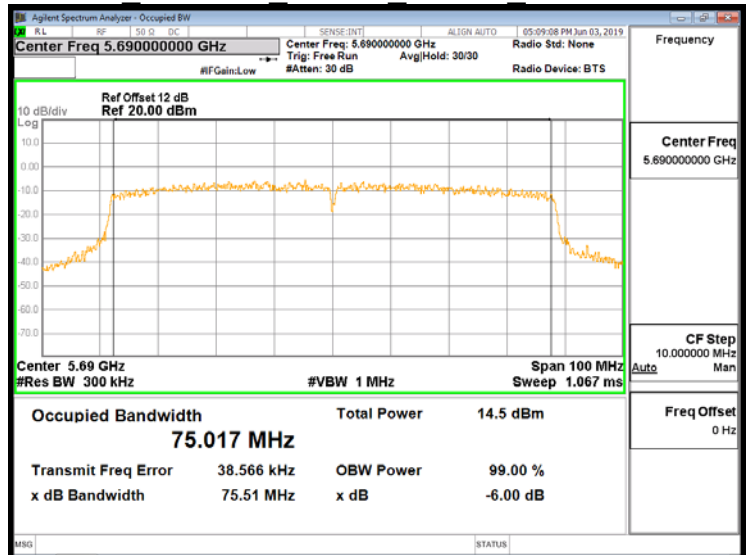
IC 802.11n 40MHz Chain0 5710MHz



IC 802.11n 20MHz Chain0 5720MHz



IC 802.11ac 80MHz Chain0 5690MHz



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8 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

FCC

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Mater device)	1 Watt(30dBm)
		Fixed point-to-point Acess Ponit	1 Watt(30dBm)
	√	Mobile and portable clinet device	250mW(23.98dBm)
U-NII-2A	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3	√		1 Watt(30dBm)
If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.			

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OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm
5250~5350 MHz	Conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$ EIRP shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm
5470-5600 MHz and 5650-5725 MHz	Conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$ EIRP shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm
5725~5850 MHz	Conducted output power shall not exceed 1 W
For equipment operating in the band 5725-5850 MHz, If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	

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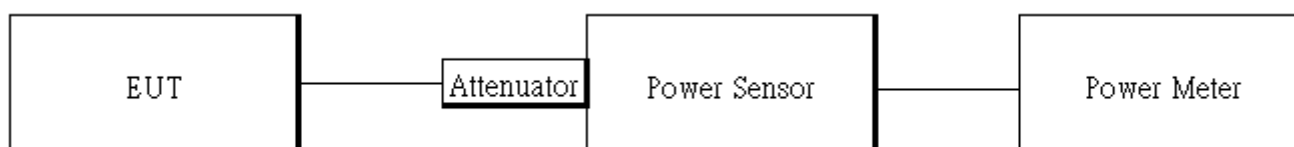
8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add 10 log(1/duty cycle).
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

8.3 Measurement Equipment Used

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1242004	10/23/2018	10/22/2019
Power Sensor	Anritsu	MA2411B	1207365	10/23/2018	10/22/2019
Power Sensor	Anritsu	MA2411B	1207368	10/24/2018	10/23/2019
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020

8.4 Test Set-up



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8.5 Measurement Result

Conducted output power (FCC)

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
144	5720(U-NII 2C)	6	6.45	4.413	23.98 or $11+10\log(B) = 22.77$	PASS
144	5720 (U-NII 3)	6	1.97	1.575	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
144	5720(U-NII 2C)	MCS0	6.03	4.008	23.98 or $11+10\log(B) = 22.82$	PASS
144	5720 (U-NII 3)	MCS0	2.16	1.644	30	PASS

802.11n_HT40_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
142	5710(U-NII 2C)	MCS0	7.12	5.155	23.98 or $11+10\log(B) = 26.40$	PASS
142	5710 (U-NII 3)	MCS0	1.08	1.281	30	PASS

802.11ac_VHT80_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
138	5690(U-NII 2C)	MCS0	8.17	6.555	23.98 or $11+10\log(B) = 29.77$	PASS
138	5690 (U-NII 3)	MCS0	0.63	1.156	30	PASS

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Conducted output power (IC)

802.11a_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
144	5720(U-NII 2C)	6.45	4.413	23.98 or $11+11\log(B) = 22.19$	PASS
144	5720 (U-NII 3)	1.97	1.575	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
144	5720(U-NII 2C)	6.03	4.008	23.98 or $11+11\log(B) = 22.38$	PASS
144	5720 (U-NII 3)	2.16	1.644	30	PASS

802.11n_HT40_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
142	5710(U-NII 2C)	7.12	5.155	23.98 or $11+11\log(B) = 26.17$	PASS
142	5710 (U-NII 3)	1.08	1.281	30	PASS

802.11ac_VHT80_Ch0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
138	5690(U-NII 2C)	8.17	6.555	23.98 or $11+12\log(B) = 29.60$	PASS
138	5690 (U-NII 3)	0.63	1.156	30	PASS

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9 MAXIMUM POWER SPECTRAL DENSITY

9.1 Standard Applicable

FCC

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Master device)	17dBm/ MHz
		Fixed point-to-point Access Ponit	
	√	Mobile and portable client device	11dBm/ MHz
U-NII-2A	√		11dBm/ MHz
U-NII-2C	√		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP spectral density 10 dBm / MHz
5250~5350 MHz	11dBm / MHz
5470-5600 MHz and 5650-5725 MHz	11dBm / MHz
5725~5850 MHz	30dBm / 500 kHz

For equipment operating in the band **5725-5850** MHz, If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

	Effective Legacy Gain (dBi)	PSD Limit	
U-NII-2C	3.50	11.00	dBm/MHz
U-NII-3	3.50	30.00	dBm/500 kHz

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9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set RBW=500 kHz, VBW $\geq$ 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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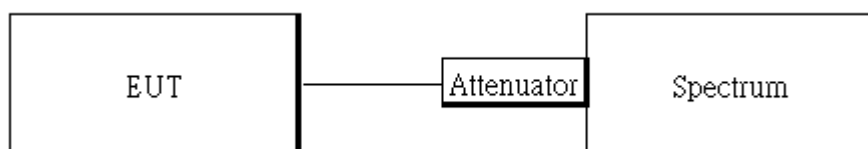
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9.3 Measurement Equipment Used

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	02/13/2019	02/12/2020
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2018	10/07/2019
DC Block	Mini-Circuits	BLK-18-S+	31129(1)	02/26/2019	02/25/2020
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020

9.4 Test Set-up



9.5 Measurement Result

POWER DENSITY 802.11a MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5720 (U-NII 2C)	-0.97	0.19	-0.78	11	-11.78
5720 (U-NII 3)	-1.99	0.19	-1.80	30	-31.80

POWER DENSITY 802.11n HT20 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5720 (U-NII 2C)	-0.54	0.20	-0.34	11	-11.34
5720 (U-NII 3)	-1.39	0.20	-1.19	30	-31.19

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POWER DENSITY 802.11n HT40 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5710 (U-NII 2C)	-4.32	0.39	-3.93	11	-14.93
5710 (U-NII 3)	-7.18	0.39	-6.79	30	-36.79

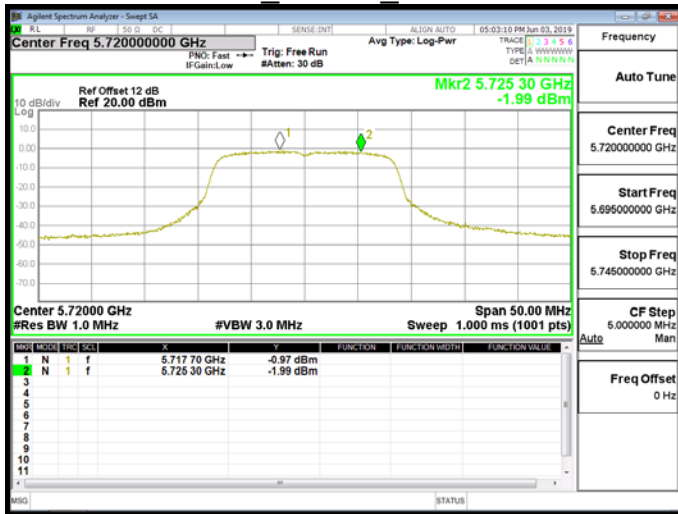
POWER DENSITY 802.11ac VHT80 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5690 (U-NII 2C)	-8.47	0.75	-7.71	11	-18.71
5690 (U-NII 3)	-13.09	0.75	-12.34	30	-42.34

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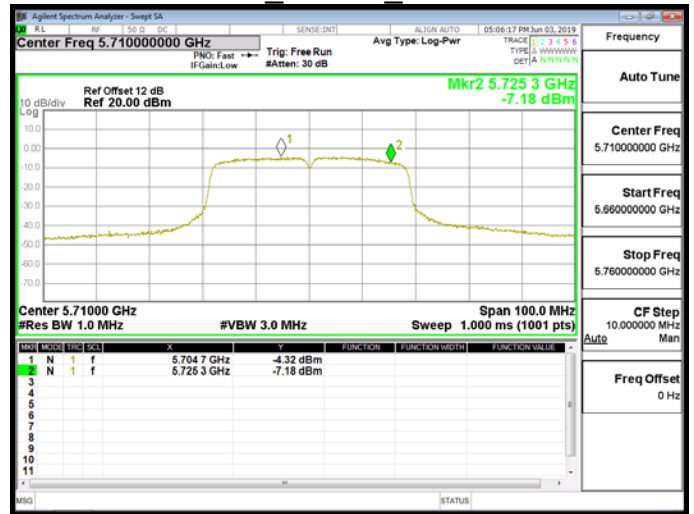
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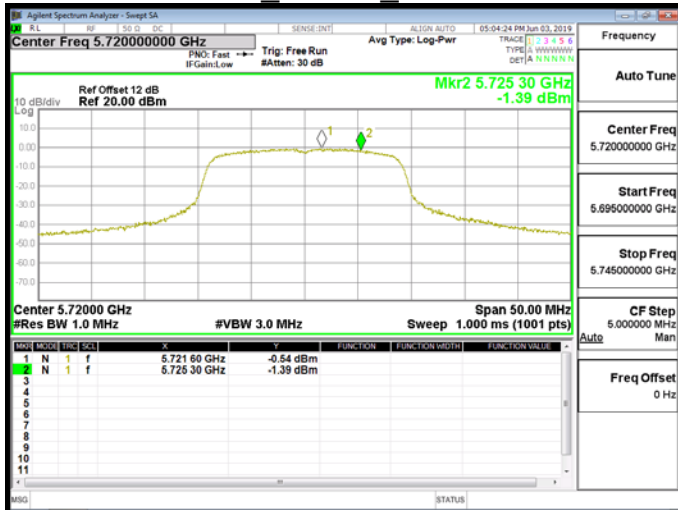
802.11a 20MHz 5720MHz



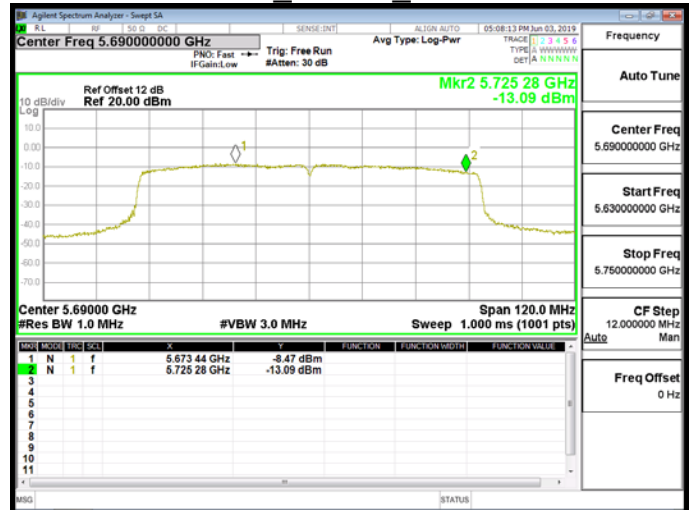
802.11n 40MHz 5710MHz



802.11n 20MHz 5720MHz



802.11ac 80MHz 5690MHz



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10 UNDESIRABLE RADIATED EMISSION MEASUREMENT

10.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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 e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV 54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1) RSS-247 6.2.1.2	PK: -27 (dBm/MHz)	PK: 68.3 (dBμV/m)
15.407(b)(2) RSS-247 6.2.2.2		
15.407(b)(3) RSS-247 6.2.3.2		
15.407(b)(4)(i) RSS-247 6.2.4.2	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
*1 beyond 75 MHz or more above of the bandedge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

$EIRP = (E \cdot d)^2 / 30$, where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts.

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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (dBμV/m)

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10.2 Measurement Equipment Used

SGS SAC-III					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	ETS LINDGREN	3116	00026370	12/26/2018	12/25/2019
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SU-HNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Cable	HUBER SU-HNER	SUCOFLEX 104PEA	20995	06/29/2018	06/28/2019
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019
High Pass Filters	MICRO TRON-ICS	HPM13195	003	02/26/2019	02/25/2020
Horn Antenna	ETS LINDGREN	3116	00026370	12/26/2018	12/25/2019
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	06/29/2018	06/28/2019
Pre-Amplifier	MITEQ	AMF-6F-260400-40-8P	985646	06/21/2018	06/20/2019
Pre-Amplifier	HP	8449B	3008A00965	06/29/2018	06/28/2019
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Software	EZ-EMC (CCS-3A1RE)				

NOTE: N.C.R refers to Not Calibrated Required.

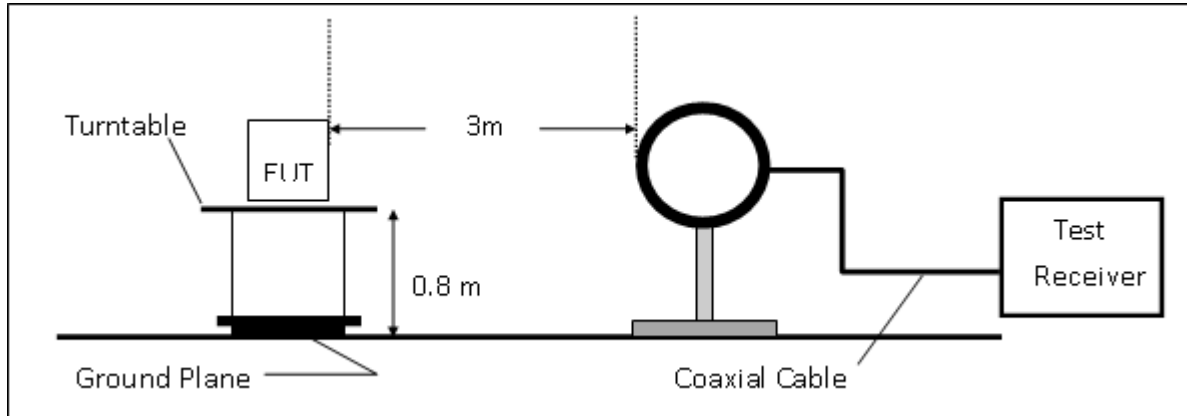
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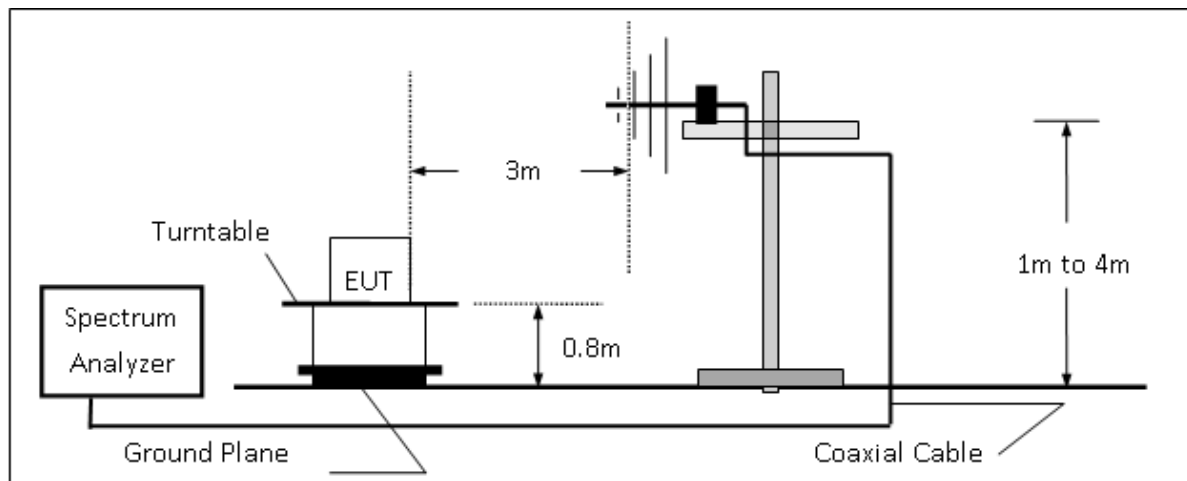
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10.3 Test SET-UP

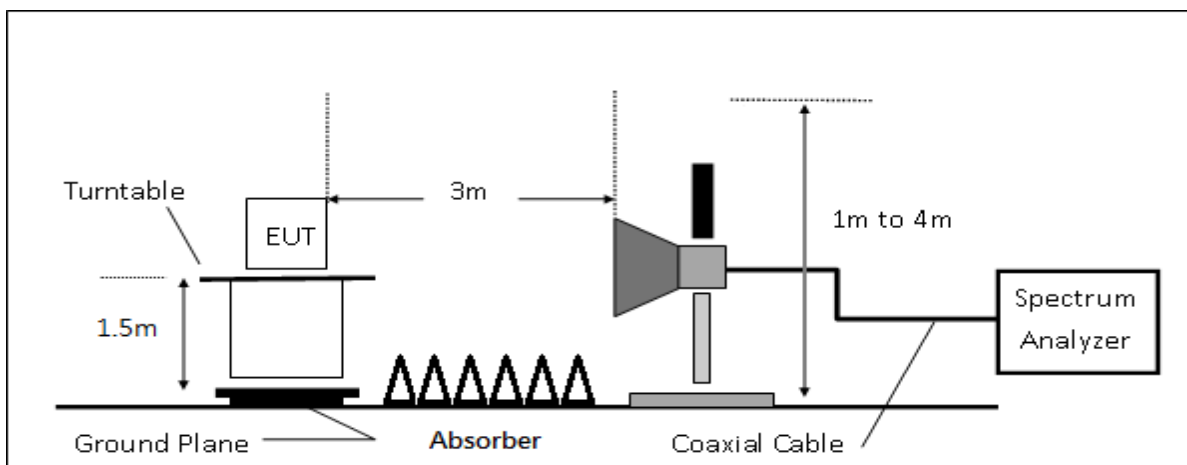
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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10.4 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
11. Repeat above procedures until all frequency measured were complete.

10.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

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10.6 Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) & RSS-GEN §6.13.2 was not reported.

Pre-scanned was done at frequency 5.47 GHz and 5.85 GHz for bandedge measurement of straddle channels 138, 142 and 144 which was 20dB lower than the limit per 15.31(o) & RSS-GEN §6.13.2 was not reported.

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10.7 Measurement Result

Radiated Spurious Emission Measurement Result

Below 1GHz Worst-Case Data:

802.11a, 5720MHz

Project Number :T190524W02

Test Date :2019-06-03

Operation Band :802.11a/Band3/4

Temp./Humi. :20.5/50

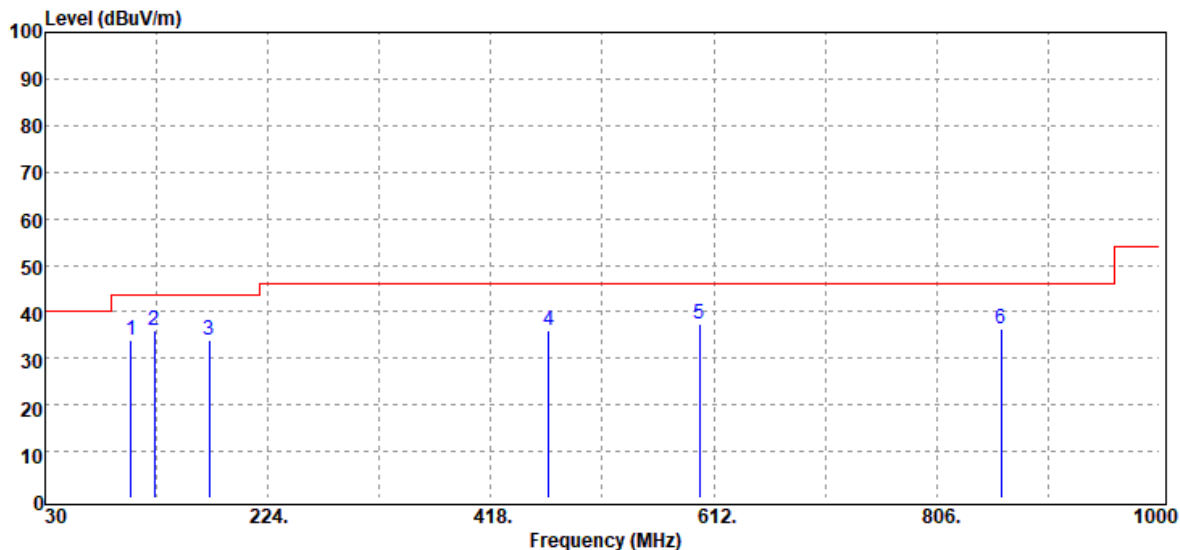
Frequency :5720 MHz

Antenna Pol. :VERTICAL

Operation Mode :Tx CH 144

Engineer :Jerry

EUT Pol. :E2 Plan



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
104.69	Peak	45.07	-11.18	33.89	43.50	-9.61
125.06	Peak	44.78	-8.80	35.98	43.50	-7.52
172.59	Peak	44.74	-10.87	33.87	43.50	-9.63
468.44	Peak	39.44	-3.44	36.00	46.00	-10.00
599.39	Peak	38.97	-1.67	37.30	46.00	-8.70
862.26	Peak	33.31	3.00	36.31	46.00	-9.69

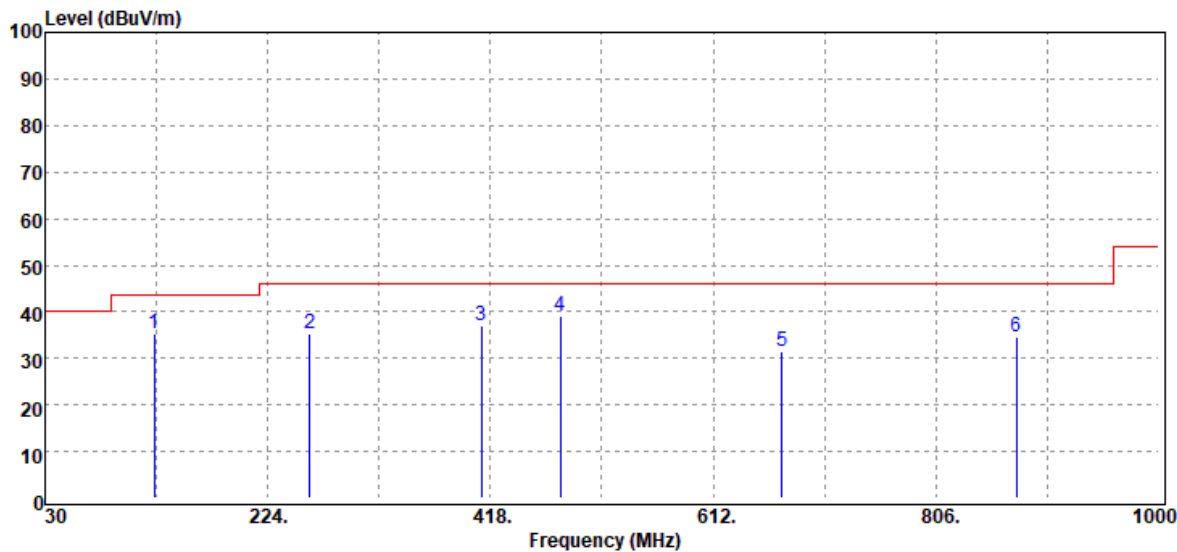
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Project Number :T190524W02
Operation Band :802.11a/Band3/4
Frequency :5720 MHz
Operation Mode :Tx CH 144
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
125.06	Peak	44.08	-8.80	35.28	43.50	-8.22
260.86	Peak	45.05	-9.59	35.46	46.00	-10.54
410.24	Peak	42.12	-5.11	37.01	46.00	-8.99
479.11	Peak	42.24	-2.98	39.26	46.00	-6.74
672.14	Peak	31.32	0.02	31.34	46.00	-14.66
875.84	Peak	31.44	3.30	34.74	46.00	-11.26

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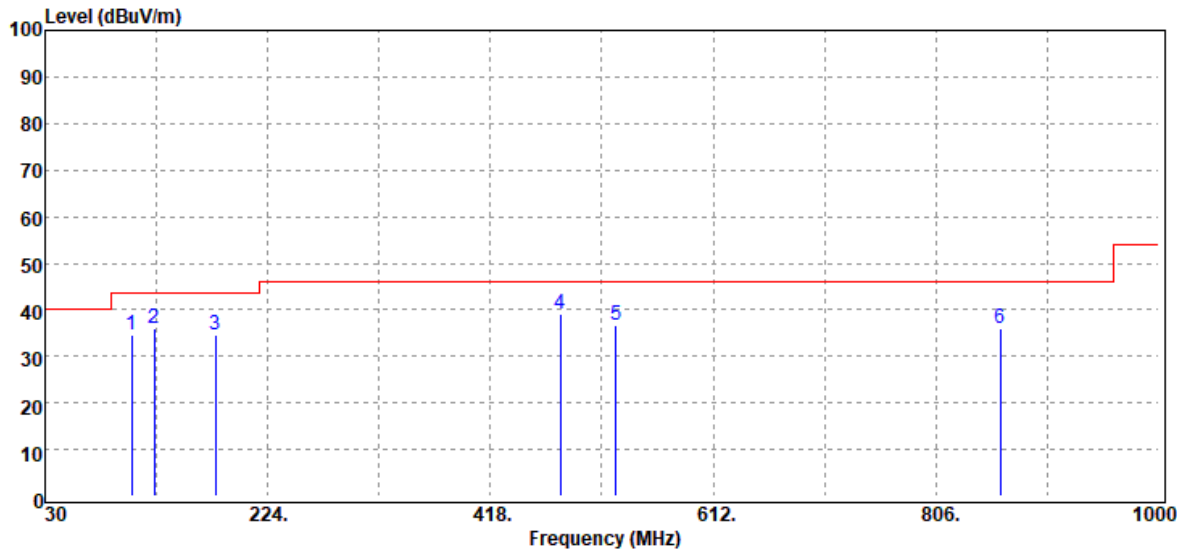
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802.11n20, 5720MHz

Project Number :T190524W02
 Operation Band :802.11n20/Band3/4
 Frequency :5720 MHz
 Operation Mode :Tx CH 144
 EUT Pol. :E2 Plan

Test Date :2019-06-03
 Temp./Humi. :20.5/50
 Antenna Pol. :VERTICAL
 Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
105.66	Peak	45.53	-11.02	34.51	43.50	-8.99
125.06	Peak	44.66	-8.80	35.86	43.50	-7.64
178.41	Peak	45.84	-11.17	34.67	43.50	-8.83
479.11	Peak	42.04	-2.98	39.06	46.00	-6.94
527.61	Peak	38.94	-2.38	36.56	46.00	-9.44
862.26	Peak	32.99	3.00	35.99	46.00	-10.01

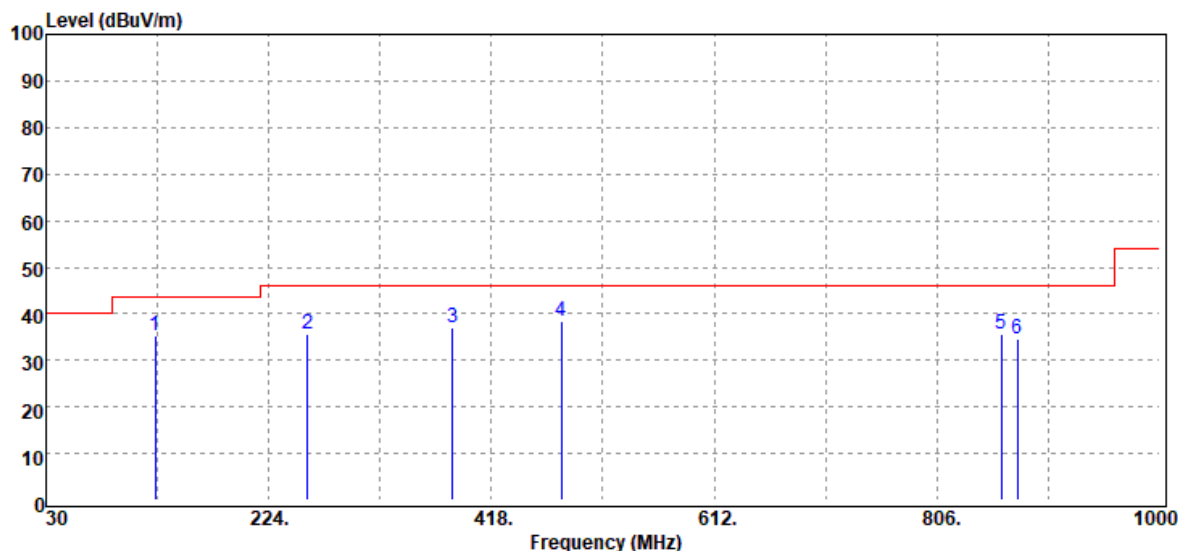
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Project Number :T190524W02
Operation Band :802.11n20/Band3/4
Frequency :5720 MHz
Operation Mode :Tx CH 144
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
125.06	Peak	44.07	-8.80	35.27	43.50	-8.23
257.95	Peak	45.68	-10.00	35.68	46.00	-10.32
384.05	Peak	43.18	-6.24	36.94	46.00	-9.06
479.11	Peak	41.50	-2.98	38.52	46.00	-7.48
862.26	Peak	32.76	3.00	35.76	46.00	-10.24
875.84	Peak	31.21	3.30	34.51	46.00	-11.49

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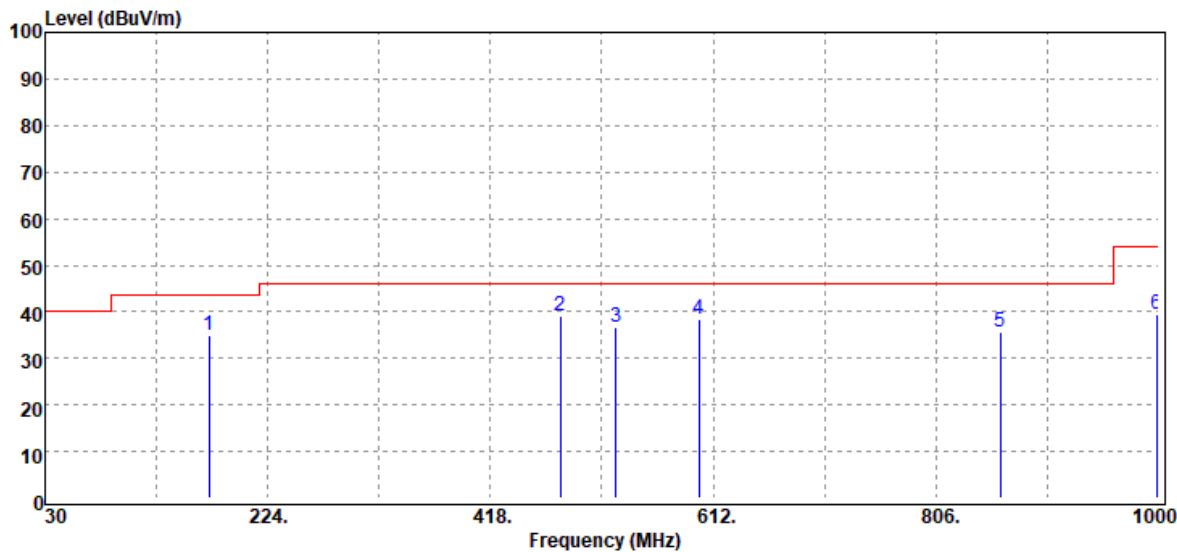
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802.11n40, 5710MHz

Project Number :T190524W02
 Operation Band :802.11n40/Band3/4
 Frequency :5710 MHz
 Operation Mode :Tx CH 142
 EUT Pol. :E2 Plan

Test Date :2019-06-03
 Temp./Humi. :20.5/50
 Antenna Pol. :VERTICAL
 Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
172.59	Peak	45.94	-10.87	35.07	43.50	-8.43
479.11	Peak	41.96	-2.98	38.98	46.00	-7.02
527.61	Peak	39.21	-2.38	36.83	46.00	-9.17
599.39	Peak	39.98	-1.67	38.31	46.00	-7.69
862.26	Peak	32.59	3.00	35.59	46.00	-10.41
998.06	Peak	34.37	5.20	39.57	54.00	-14.43

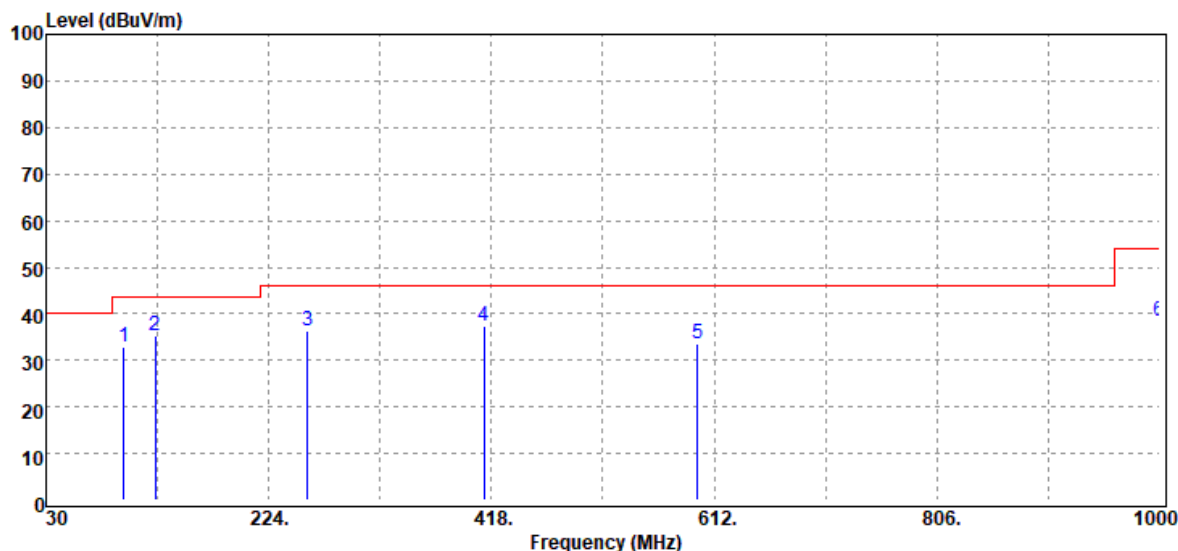
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Project Number :T190524W02
Operation Band :802.11n40/Band3/4
Frequency :5710 MHz
Operation Mode :Tx CH 142
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V/m	Limit @3m dB μ V/m	Margin dB
97.90	Peak	46.16	-13.24	32.92	43.50	-10.58
125.06	Peak	44.16	-8.80	35.36	43.50	-8.14
257.95	Peak	46.28	-10.00	36.28	46.00	-9.72
411.21	Peak	42.52	-5.00	37.52	46.00	-8.48
597.45	Peak	35.28	-1.63	33.65	46.00	-12.35
1000.00	Peak	33.19	5.27	38.46	54.00	-15.54

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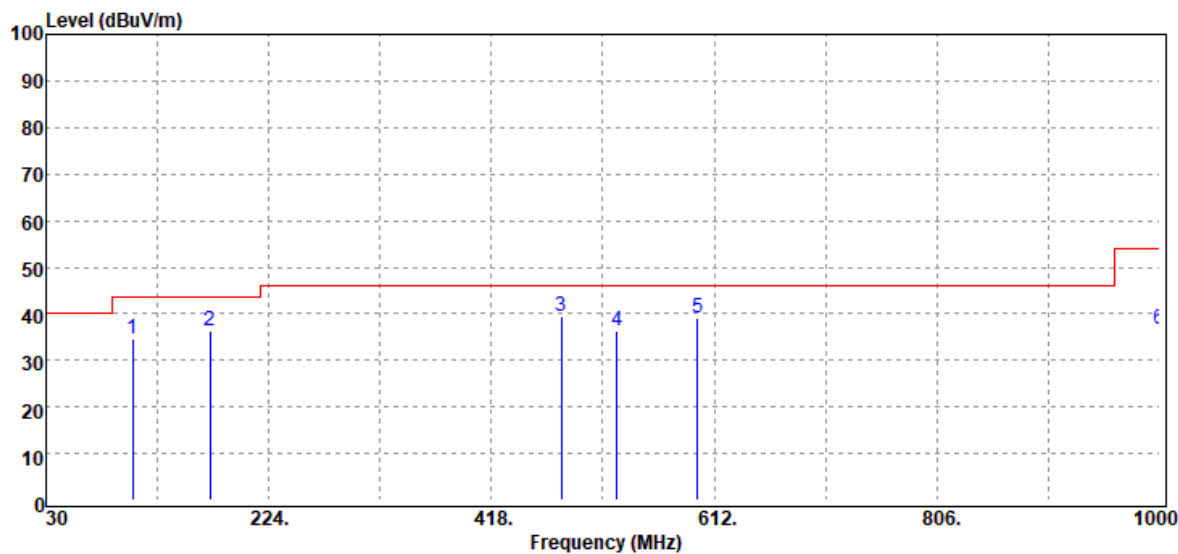
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802.11ac80, 5690MHz

Project Number :T190524W02
 Operation Band :802.11ac80/Band3/4
 Frequency :5690 MHz
 Operation Mode :Tx CH 138
 EUT Pol. :E2 Plan

Test Date :2019-06-03
 Temp./Humi. :20.5/50
 Antenna Pol. :VERTICAL
 Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
105.66	Peak	45.61	-11.02	34.59	43.50	-8.91
172.59	Peak	47.08	-10.87	36.21	43.50	-7.29
479.11	Peak	42.33	-2.98	39.35	46.00	-6.65
527.61	Peak	38.72	-2.38	36.34	46.00	-9.66
597.45	Peak	40.64	-1.63	39.01	46.00	-6.99
1000.00	Peak	31.33	5.27	36.60	54.00	-17.40

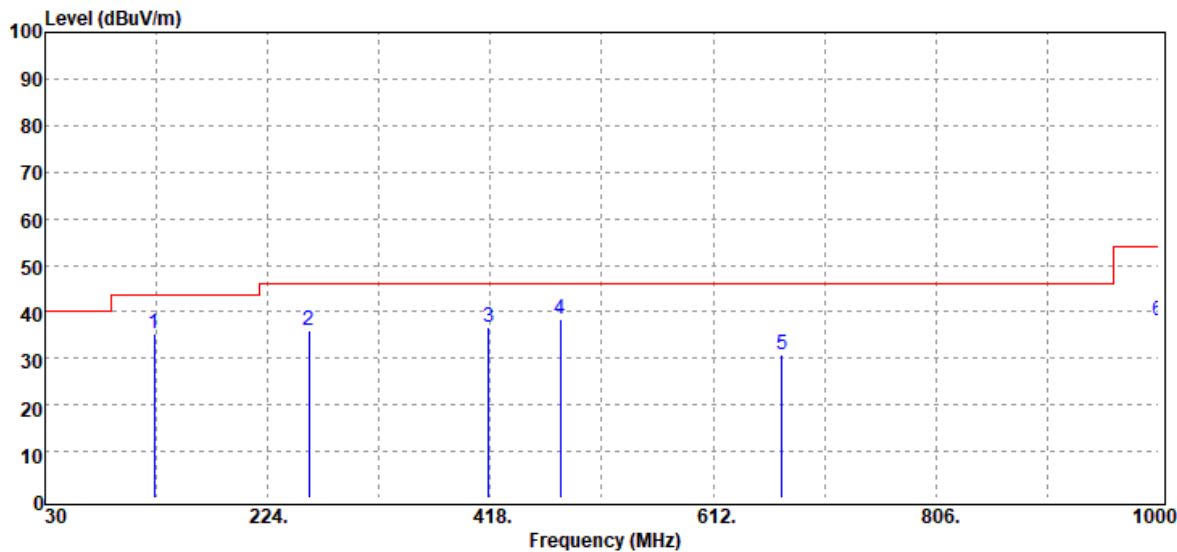
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Project Number :T190524W02
Operation Band :802.11ac80/Band3/4
Frequency :5690 MHz
Operation Mode :Tx CH 138
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
125.06	Peak	44.25	-8.80	35.45	43.50	-8.05
259.89	Peak	45.62	-9.77	35.85	46.00	-10.15
416.06	Peak	41.47	-4.89	36.58	46.00	-9.42
479.11	Peak	41.39	-2.98	38.41	46.00	-7.59
672.14	Peak	30.92	0.02	30.94	46.00	-15.06
1000.00	Peak	32.66	5.27	37.93	54.00	-16.07

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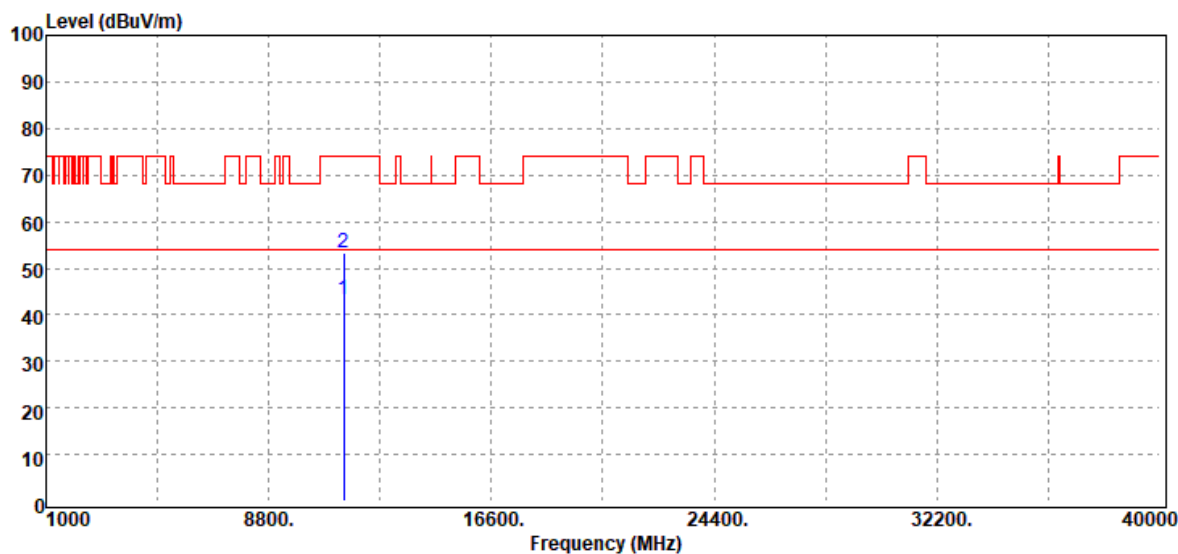
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Above 1GHz Worst-Case Data:

Radiated Spurious Emission Measurement Result 802.11a, 5720 MHz

Project Number	:T190524W02	Test Date	:2019-06-03
Operation Band	:802.11a/Band3/4	Temp./Humi.	:20.5/50
Frequency	:5720 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Tx CH 144	Engineer	:Jerry
EUT Pol.	:E2 Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11440.00	Average	26.32	17.09	43.41	54.00	-10.59
11440.00	Peak	36.28	17.09	53.37	74.00	-20.63

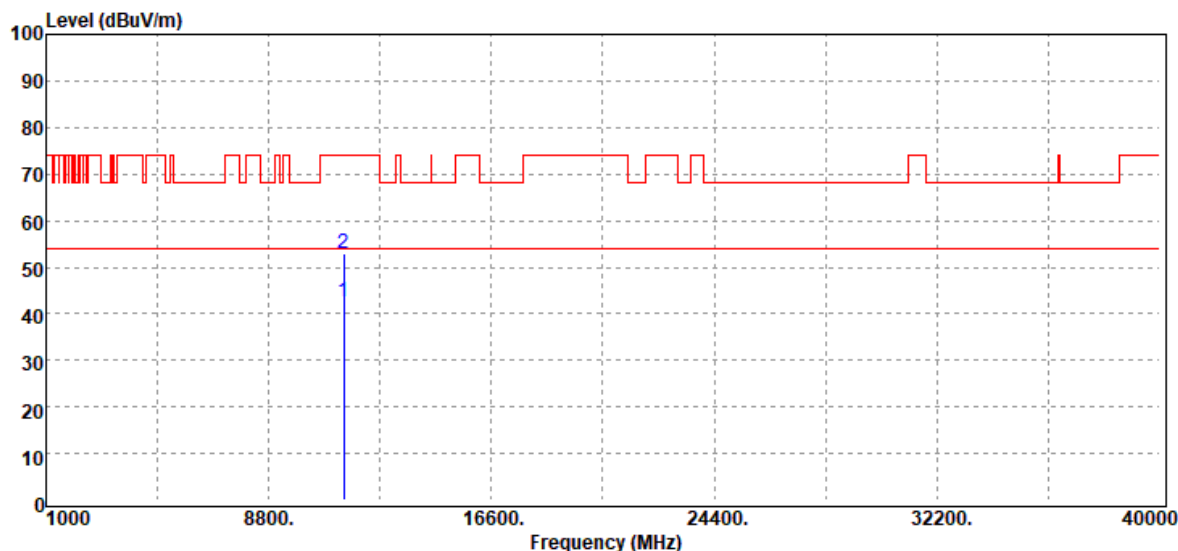
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Project Number :T190524W02
Operation Band :802.11a/Band3/4
Frequency :5720 MHz
Operation Mode :Tx CH 144
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11440.00	Average	25.32	17.09	42.41	54.00	-11.59
11440.00	Peak	35.75	17.09	52.84	74.00	-21.16

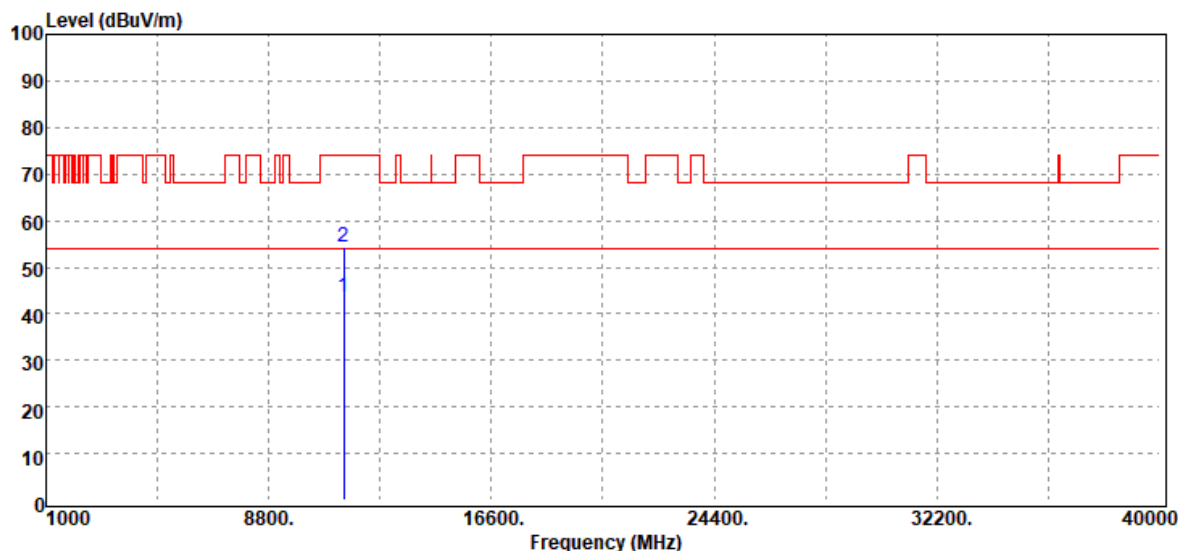
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Radiated Spurious Emission Measurement Result 802.11n HT20, 5720 MHz

Project Number	:T190524W02	Test Date	:2019-06-03
Operation Band	:802.11n20/Band3/4	Temp./Humi.	:20.5/50
Frequency	:5720 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Tx CH 144	Engineer	:Jerry
EUT Pol.	:E2 Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11440.00	Average	26.53	17.09	43.62	54.00	-10.38
11440.00	Peak	37.11	17.09	54.20	74.00	-19.80

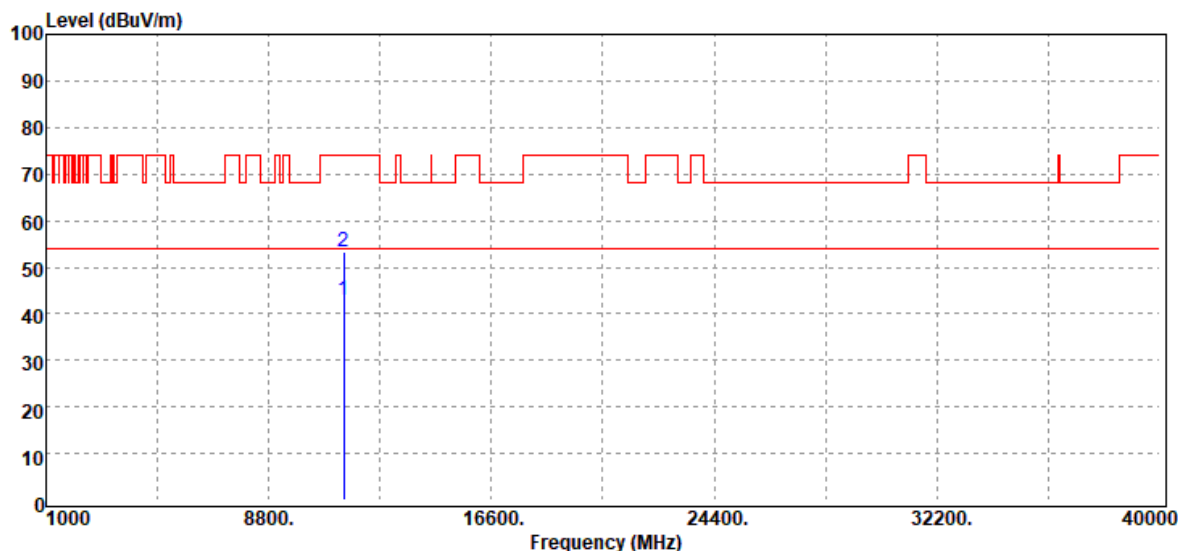
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Project Number :T190524W02
Operation Band :802.11n20/Band3/4
Frequency :5720 MHz
Operation Mode :Tx CH 144
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11440.00	Average	25.88	17.09	42.97	54.00	-11.03
11440.00	Peak	36.11	17.09	53.20	74.00	-20.80

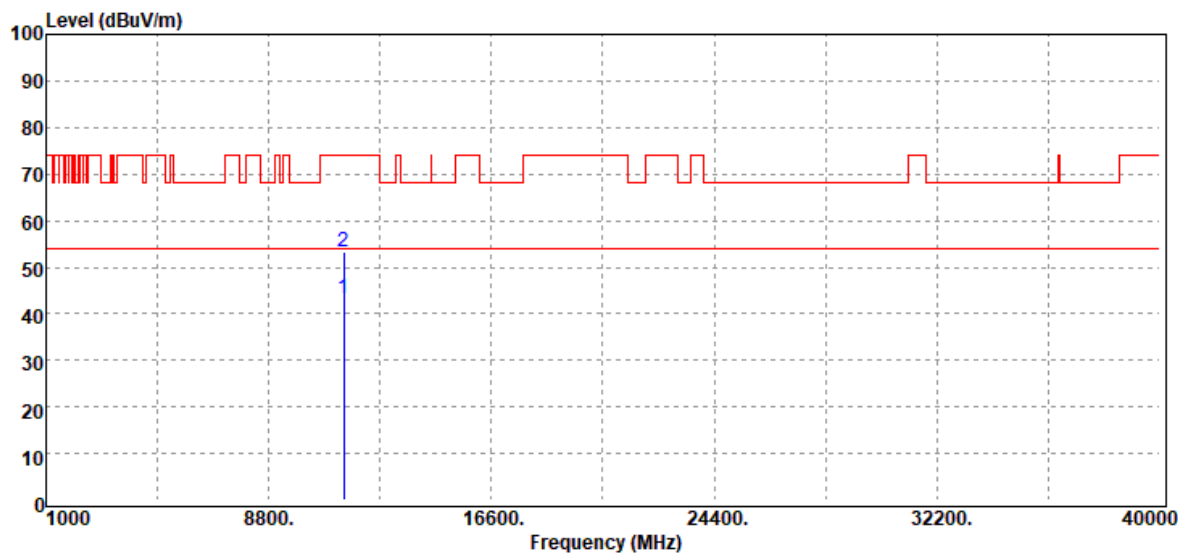
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Radiated Spurious Emission Measurement Result 802.11n HT40, 5710 MHz

Project Number	:T190524W02	Test Date	:2019-06-03
Operation Band	:802.11n40/Band3/4	Temp./Humi.	:20.5/50
Frequency	:5710 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Tx CH 142	Engineer	:Jerry
EUT Pol.	:E2 Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11420.00	Average	26.15	17.08	43.23	54.00	-10.77
11420.00	Peak	36.22	17.08	53.30	74.00	-20.70

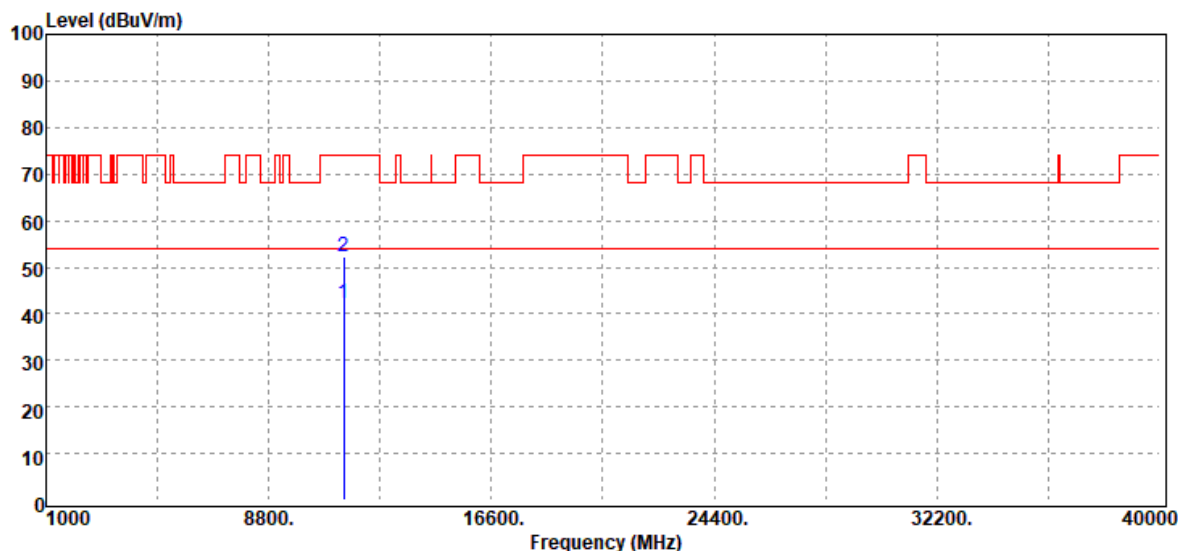
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Project Number :T190524W02
Operation Band :802.11n40/Band3/4
Frequency :5710 MHz
Operation Mode :Tx CH 142
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11420.00	Average	25.13	17.08	42.21	54.00	-11.79
11420.00	Peak	35.17	17.08	52.25	74.00	-21.75

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Radiated Spurious Emission Measurement Result 802.11ac VHT80, 5690 MHz

Project Number :T190524W02

Test Date :2019-06-03

Operation Band :802.11ac80/Band3/4

Temp./Humi. :20.5/50

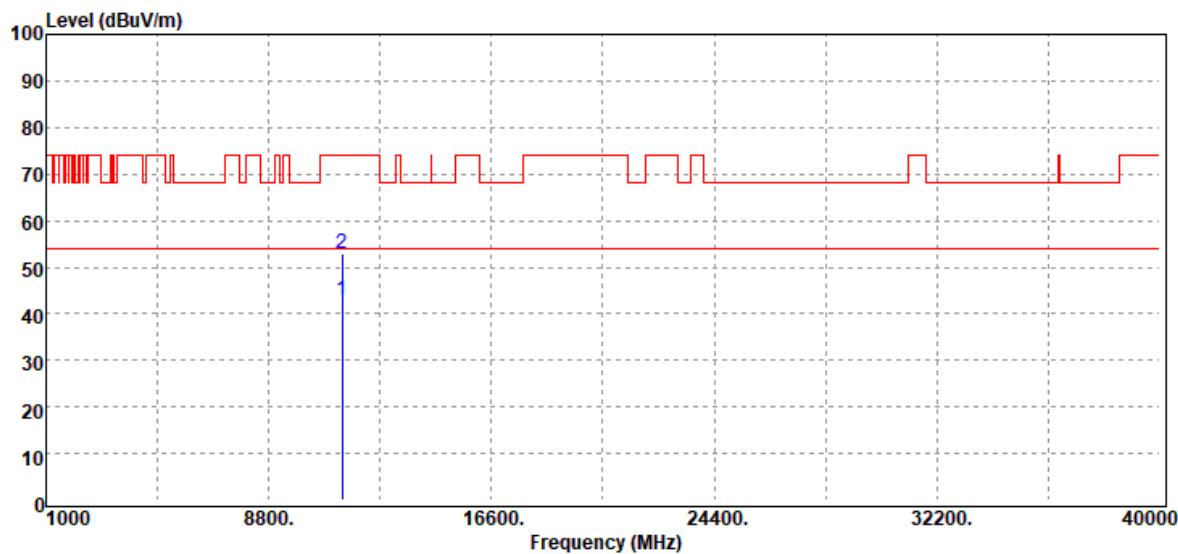
Frequency :5690 MHz

Antenna Pol. :VERTICAL

Operation Mode :Tx CH 138

Engineer :Jerry

EUT Pol. :E2 Plan



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11380.00	Average	26.11	16.77	42.88	54.00	-11.12
11380.00	Peak	36.02	16.77	52.79	74.00	-21.21

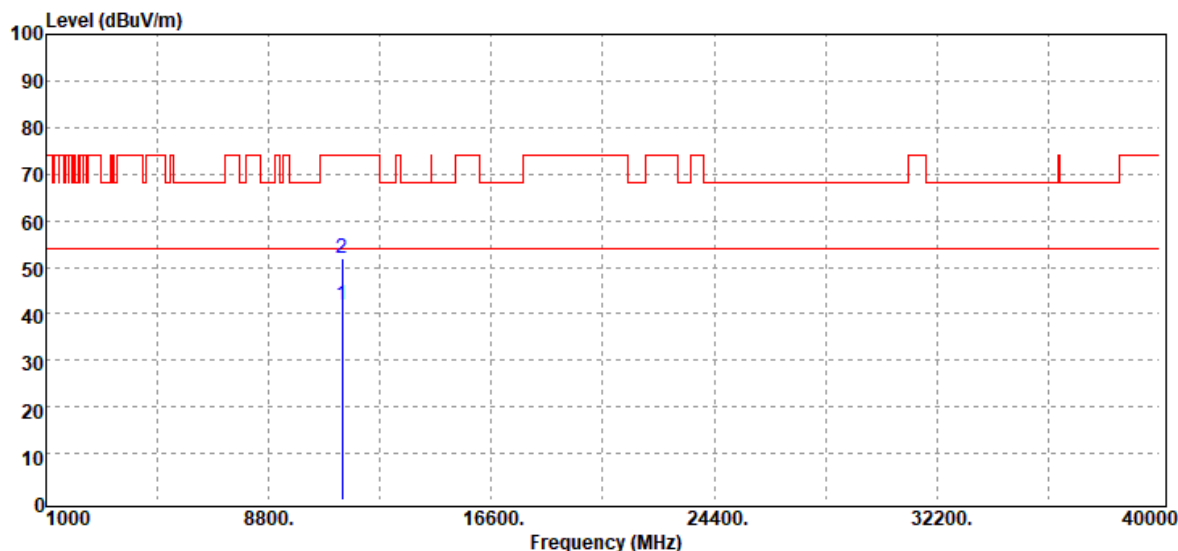
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Project Number :T190524W02
Operation Band :802.11ac80/Band3/4
Frequency :5690 MHz
Operation Mode :Tx CH 138
EUT Pol. :E2 Plan

Test Date :2019-06-03
Temp./Humi. :20.5/50
Antenna Pol. :HORIZONTAL
Engineer :Jerry



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
11380.00	Average	25.22	16.77	41.99	54.00	-12.01
11380.00	Peak	35.13	16.77	51.90	74.00	-22.10

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11 TRANSMISSION IN THE ABSENCE OF DATA

11.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

11.2 Result

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

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12 FREQUENCY STABILITY

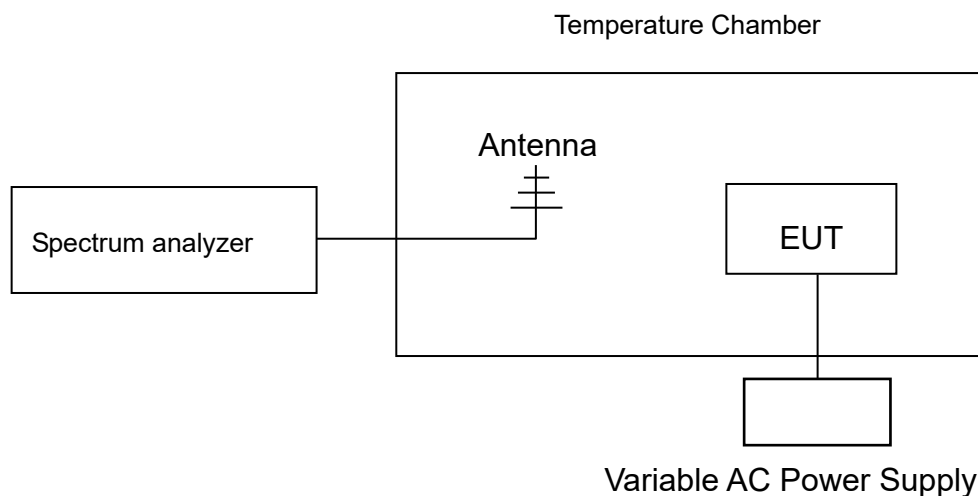
12.1 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

12.2 Measurement Procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

12.3 Test SET-UP



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12.4 Measurement Equipment Used:

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	02/13/2019	02/12/2020
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2018	10/07/2019
DC Block	Mini-Circuits	BLK-18-S+	31129(1)	02/26/2019	02/25/2020
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020

12.5 Measurement Result

Startup:

Operation Mode	802.11 a	Test Date	2019.06.03
Temperature	: 23.4°C	Test By	Gary
Humidity	: 53%		

Test Temp.(°C)	Test Volt-age(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-40	3.795	144	5720	5,719.99381	0.00000108
	2.805	144	5720	5,719.99088	0.00000159
25	3.3	144	5720	5,720.00114	-0.00000020
85	3.795	144	5720	5,720.00900	-0.00000157
	2.805	144	5720	5,720.00774	-0.00000135

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2 Minutes:

Operation Mode	802.11 a	Test Date	2019.06.03
Temperature	: 23.4°C	Test By	Gary
Humidity	: 53%		

Test Temp.(°C)	Test Volt-age(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-40	3.795	144	5720	5,719.99266	0.00000128
	2.805	144	5720	5,719.99251	0.00000131
25	3.3	144	5720	5,720.00726	-0.00000127
85	3.795	144	5720	5,720.00917	-0.00000160
	2.805	144	5720	5,720.00406	-0.00000071

5 Minutes:

Operation Mode	802.11 a	Test Date	2019.06.03
Temperature	: 23.4°C	Test By	Gary
Humidity	: 53%		

Test Temp.(°C)	Test Volt-age(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-40	3.795	144	5720	5,719.99196	0.00000141
	2.805	144	5720	5,719.99087	0.00000160
25	3.3	144	5720	5,720.00304	-0.00000053
85	3.795	144	5720	5,720.00815	-0.00000142
	2.805	144	5720	5,720.00635	-0.00000111

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10 Minutes:

Operation Mode	802.11 a	Test Date	2019.06.03
Temperature	: 23.4°C	Test By	Gary
Humidity	: 53%		

Test Temp.(°C)	Test Volt-age(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-40	3.795	144	5720	5,719.99308	0.00000121
	2.805	144	5720	5,719.99633	0.00000064
25	3.3	144	5720	5,720.00453	-0.00000079
85	3.795	144	5720	5,720.00445	-0.00000078
	2.805	144	5720	5,720.00719	-0.00000126

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13 ANTENNA REQUIREMENT

13.1 Standard Applicable

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

According to §15.407, 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.

13.2 Antenna Connected Construction

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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